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NRA Bars APEM Price Plans

End Uncertainty with Declaration That Supplements Must Conform to New Policy

WASHINGTON—Price provisions in conflict with the new policy recently announced by NRA (A. I. June 16, 1934, page 732) must be knocked out of all the APEM product group supplemental codes. Notice to this effect was served by Deputy Administrator I. D. Everitt at the hearing on the 14 supplemental codes which began last Monday. The policy bars the fixing even of minimum prices except in emergencies but permits open price provisions where desired by an industry under conditions requiring posting of prices with a confidential disinterested agency for distribution to all members of the industry and customers willing to pay for the service. Such posted prices are not to be changed for 48 hr.

The groups indicated their willingness to comply with the deputy's instruction. It was explained that the supplemental codes had been made up before the new pricing policy was announced. Moreover, it was not known exactly how the policy would operate and the groups have asked time to study the new policy in order to revise their codes in accordance with it.

Meanwhile hearings on the 14 supplements set for consideration this week are continuing as scheduled. On Monday, during the hearing on the wheel and rim supplement, C. C. Carlton, of Motor Wheel, stated that the number of employees in the entire automotive parts and equipment industry had increased from 72,800 in February, 1933, to 180,222 in March, 1934. Among those in attendance at the session on this supplement were H. W. Hooper and W. A. Baker, of Firestone Steel Products Co. and D. F. Alexander, Budd Wheel.

The powdered metal hearing supplement was presented by H. Johnson of the Boundbrook Oil-Less Bearing Co., and other representatives of the group present were Earl S. Patch, Moraine Products Co., and R. H. Khuen, U. S. Graphite Co.

J. A. Graham of Motor Improvements, presented the oil filter supplement. A. A. Buhl represented the AC Spark Plug Co. at this session. The internal combustion engine group was represented by E. F. Deacon of the Climax Engineering Co.

Overlapping of interests under the sections on definitions in the foregoing and other supplements heard this week were cited by representatives of the machine and allied products industry code authority and of the Grey Iron Founders Society. The Mail

(*Turn to page* 792, *please*)

Henry Ford
World's work can be done in 30-hour week (see page 788)

Knowlson Named Chairman Of Stewart-Warner Board

CHICAGO—Stewart-Warner Corporation announces the election of James S. Knowlson as chairman of the board of directors, to succeed R. J. Graham, deceased. Mr. Knowlson has been active in the manufacturing field in Chicago for many years, having been connected with the Speedway Manufacturing Company since 1909 and is now president and general manager of that company. Prior to his association with the Speedway Manufacturing Company, he was with the General Electric Company for several years. It is announced that he will take an active interest in the management of Stewart-Warner Corporation.

Report Pontiac Spending $200,000 for Equipment

DETROIT—The Pontiac Motor Co. is reported to have placed orders with machine tool builders for over $200,000 worth of equipment. Part of the expenditures were for new machinery and part for the rebuilding of tools already in the Pontiac plant.

Dealers Concluding Factory Backing Is Last Hope for Code Enforcement

PHILADELPHIA—Whether a satisfactory degree of compliance with the used car allowance and new car price maintenance provisions of the motor vehicle retailing code can be attained, a steadily increasing number of dealers are concluding, hinges entirely on how far motor car makers will go in cooperating with dealer administrative agencies in enforcement.

As a direct consequence of this trend of dealer opinion, action already is being taken in a number of important States looking toward the presentation of petitions to factory executives asking them to go on record to the effect that they are in favor of the code as a beneficial influence in the industry and that they expect their field men and dealer organizations to cooperate in its observance. Back

N.S.P.A. Board Meets

Left to right around the table are D. W. Rodger, J. A. Wheatley, Jr., H. M. Smith, L. G. Matthews, Doris Whelan, H. J. Moore, L. F. Hunderup, E. P. Chalfant, F. S. Durham, B. Patterson, W. H. Richardson, D. Rosenbach, W. D. Foreman, and R. M. Allison.

of such petitions, if they are actually presented, of course, will lie the hope, or the wish, that the factories will back up their endorsement with cancellation of dealers who persistently refuse to abide by the code. While dealers recognize that cancellation of a dealer's contract for alleged violations of the code would be fraught with obvious legal perils for the manufacturer, they feel that this difficulty can be circumvented.

It is no secret that chiseling of and dissatisfaction with enforcement of the dealer code has been increasing rapidly, particularly since the first of April. Prior to that time, due to the delays in production, dealers had more customers than cars and code observance was the rule. Since that time, stocks have been adequate to meet demand in general and as a result the incentive to chisel has become constantly more powerful.

Meanwhile dealers have come to believe more and more that no relief can be expected from Washington. So far, aside from the removal of Blue Eagles, the government has secured an injunction against only one dealer restraining him from further code violations and no dealer has been fined or sent to jail for cutting prices. As a result, they have about come to the conclusion that the government does not intend to invoke the punitive sections of the N.I.R.A. against violators of fair trade practices and in this conclusion it appears more than probable that they are correct, since it is doubtful that popular sentiment would support convictions for selling merchandise to the public cheaper. In fact there is some reason to believe that NRA compliance agencies are taking the attitude that industry wanted fair trade practices and it must now assume the responsibility for enforcing them. NRA will enforce the wage and hour provisions, but if industry can't enforce its own trade practices it is just too bad.

The situation is acute in some States. In one State, at least, dealers in their disgust with the lack of punitive enforcement have quit contributing to their State enforcement agency and as a result, it is reported the agency is several weeks in arrears on salaries.

This attitude is believed to be spreading. Consequently, unless the government cracks down very soon on violators, which dealers believe it has no intention of doing or the factories come to the rescue, it is quite possible that the motor vehicle retail code will be written in history as one more attempt to control prices that failed. If this is its destiny, there will be some elements of tragedy in the situation, because there is no doubt that the great mass of them are in favor of the code and want to see it work. Moreover, they feel that if this effort fails, it will be a long time before they get another opportunity to attack the used car problem cooperatively.

New Car Retail Sales Value Registers Drop

WASHINGTON—Preliminary figures of the value of retail sales of new passenger automobiles show a decrease from April to May of more than the usual seasonal amount, according to the Bureau of Foreign and Domestic Commerce.

The Bureau's index, which makes allowance for the number of days and for the usual seasonal movements, was 55.5 in May on the basis of the 1929-1931 average as 100, compared with 59.0 in April and 64.5 in March.

The value of sales in May, according to these preliminary figures, was 31 per cent greater than in May, 1933, and 50 per cent larger than in May, 1932. The aggregate for the first five months was 56 per cent above that for the corresponding figure of last year and 41 per cent above that for the first five months of 1932.

Ford Again Boosts 6 Hr. Day, 5 Day Wk.

Sees Nothing Wrong With Business; Believes Price Cuts "Cleared Things"

DETROIT—The world's work can be done in a five-day week, six-hour day Henry Ford told newspaper men recently. He added that he believed it the best means of giving people time to "use up what they make" and keep a balance between production and consumption. Mr. Ford said he saw nothing wrong with business and didn't believe anyone could peg progress at a certain point and say that's as far as the world can go.

Mr. Ford granted the interview as he watched the millionth V-8 come off the assembly line. He said he felt recent automobile price reductions had "cleared up things." However, he added he did not believe that prices have been stabilized. He said:

"Nothing is stabilized in the world. There is one thing that is always with us—change. It's ceaseless. People are always trying to fix things, improve things, make them a little different from what they are."

In response to a question of whether he thought we will remain stationary and be regimented, Mr. Ford answered that he did not. He said "it can't be done." When asked if he had paid much attention to the last Congress, the manufacturer said he hadn't and didn't believe many other people did.

Bauer Sails for Europe

NEW YORK, June 28—George F. Bauer, secretary of the export committee of the National Automobile Chamber of Commerce, will sail Saturday for a three and one-half months tour through European countries. His itinerary includes Paris, Brussels, Amsterdam, Copenhagen, Stockholm, Warsaw, Geneva, Madrid and Lisbon. He will also visit Munich during the first week of September to attend the International Road Congress.

Hudson Motor Car Co.

DETROIT—Latest available reports indicate that Hudson Motor Car Co.'s cash on hand exceeds current accounts payable, none of which are due at this time. Bank loans carried by the company, which reached their peak in the early spring, and which subsequently have been reduced are now below the full line of credit available, according to the reports. On May 21 the company's inventories stood at $4,484,000 against $7,094,000 on April 30 of this year.

Though current operations are being financed by the company's banks and dealer operations are being financed by Commercial Investment Trust, both are on a satisfactory basis. During the period between April 30 and May 21 Hudson's accounts payable were reduced from $6,110,000 to $1,731,000.

July Production Schedules Increased By Ford, Chevrolet on June Sales Basis

by Burnham Finney

DETROIT—Response of the buying public to lower retail prices and to introduction of new models has been so favorable that the industry's two leading manufacturers—Ford and Chevrolet—are reported to have made upward revisions in their manufacturing schedules for next month. In addition, Plymouth broke all-time records for daily output at its local plant on three successive days during the past week. Although retail sales are beginning to slide off now that the first wave of buying following the price cuts has passed, total retail deliveries of passenger cars for the month of June are expected to be about equal to the 220,000 units in May. Assemblies this month are likely to be at least 290,000 units and may touch the 300,000 mark.

While sales reports from sections of the country affected by the prolonged drought are scarcely encouraging, business in the Southwest, particularly Texas, is brisk because of good cotton crops, improvement in the oil industry and high prices for cattle. A prominent low price car maker, for example, states that it shipped three trainloads of passenger cars into three Texas cities on Saturday and by Monday all of these cars had been sold by local dealers.

Retail sales are expected to show a considerable decline during July but the downward movement probably won't be so sharp as manufacturers had anticipated. Chevrolet's retail sales in the second 10 days of June are understood to have been about 35 per cent better than in the first 10 days during which dealers delivered 25,935 cars. For the entire month it is believed that Chevrolet sales will exceed those in May by a comfortable margin. Originally reported to have planned on making about 75,000 units in July, Chevrolet has increased its projected output to 90,000 units. There is still said to be a shortage of Chevrolet cars in dealer's hands in certain parts of the country.

Although no official figures are at hand as to the effect of the reduction of Ford prices, it is regarded as significant that Ford has increased its tentative production schedule for July. Ford's assemblies this month probably will be 90,000 to 95,000 units.

Plymouth made retail sales of 8560 cars during the week ended June 23, a shade less than in the previous week, but a gain of 25.4 per cent over the corresponding week of last year and 22 per cent over the same week in May.

Manufacturers in the lower medium-price brackets have felt the stimulus of price reductions. One company in this field states that its retail sales in the first 20 days of June were running abreast of those in the same period in May, and whether May or June will be the better month in sales volume is still uncertain.

Retail sales of Hudson and Terraplane cars for the week ended June 16, amounted to 1950 units, compared with 1725 units the previous week.

Studebaker, having announced new models the past week, has sharply increased its production at South Bend.

In the first five months of this year Buick exports totalled 3823, more than three times as great as in the corresponding period of last year, and within 300 cars of doubling the entire export volume of last year. June export requirements are for 1010 cars while those for July are for 1127 cars. Indicated export requirements for the remainder of the year are estimated by the factory, for 1934, at 8960 units.

DeSoto Motor Corp. reports that DeSoto dealers sold a total of 2901 DeSoto and Plymouth cars during the week, compared with 2474 units sold in the preceding week.

Dodge dealers during the week ending June 16, made retail deliveries amounting to 6401 passenger cars and trucks. This is an increase of 22.5 per cent over the preceding week and a gain of 36.3 per cent over sales in the corresponding week of 1933.

The year-to-date total of Dodge dealers' retail deliveries on June 16, accounted for 89,726 passenger cars and 20,380 trucks, a total of 110,106 vehicles, compared to 58,999 passenger cars and trucks delivered during the corresponding period of last year.

Retail sales of Airflow De Soto cars at A Century of Progress Exposition this year have increased 25 per cent over last year, according to H. C. Jamerson, director of advertising and sales promotion for De Soto.

Auburn export sales for the first five months of 1934 are more than 150 per cent greater than during the entire year of 1933. Since January first, the company has appointed new dealers and distributors in 33 markets in 21 countries, according to R. S. Wiley, export manager.

Shipments of Chrysler cars from Canadian plants during the first five months of this year exceeded the total for 1933. The increase was placed at 218 per cent over the corresponding period for last year. Truck and commercial car sales from Jan. 1 to May 30, are estimated at more than four times the number of units for the same period of 1933.

Dodge Brothers' truck shipments from the Canadian plant for the five months ending May 30, were more than four times the volume for the corresponding five months of 1933. The number of trucks shipped so far this year also top the number for the same time in 1929, and are greater than for any one year from 1930 to 1933.

Ford Leads May New Car Registrations

DETROIT—Based on returns from 40 states, Ford took first place in new passenger car registrations in May, his total being estimated at 64,900, against 55,900 for Chevrolet and 32,500 for Plymouth.

Total registrations of all makes in May approximated 211,989, as compared with 222,900 in April and 160,242 in May, 1933. May truck registrations, on the basis of 38 states, are estimated at 42,000, an increase of 91 per cent over last year and of 3 per cent over the April, 1934, total of 38,882.

The following table gives a comparison of the May passenger car estimates with the previous month and the corresponding month last year:

	May, 1934*	April, 1934	May, 1933
Ford	64,900	61,950	32,407
Chevrolet	55,900	63,458	52,420
Plymouth	32,500	34,274	24,986
Total all makes	211,989	222,900	160,242

*Estimates based on returns from 40 states.

Hudson Drops Agency

DETROIT—Hudson Motor Car Co. has withdrawn its advertising account from the Blackman Co. and is expected to announce its new agency within a few days.

Mr. Miller Tells One

General Motors production men en route to the Century of Progress Exposition listen to J. F. Miller (right), manager of Chevrolet's gray iron foundry at Saginaw, spin a yarn. The others are E. S. Wallace (left) manager, Chevrolet Bay City plant, and M. L. Hillmer (center), manager of the Saginaw steering gear factory

Drive to Unionize All Automotive Workers Seen in New Council Setup

DETROIT—To coordinate union labor activities in the automobile industry and to present a solid front in the drive for unionization, delegates to the first national conference of the United Automobile Workers Federal Labor Unions, meeting Saturday and Sunday at the Fort Wayne Hotel in this city, voted for creation of a national council. Consisting of 11 members, this council apparently is to act as an executive body to direct the actions of all unions affiliated with the American Federation of Labor whose members are employed in the automobile industry.

William Green, president of the A. F. of L., proposed the plan for establishment of the council. He said that the Federation would finance the council on condition that the chairman be named by the A. F. of L. and that only matters presented by the national A. F. of L. representative be considered by the council. There was reported to have been considerable opposition to the program on the grounds that Mr. Green, with the assistance of William Collins, his chief lieutenant at Detroit, was trying to "railroad" the meeting. The program is reported to have been adopted by only a narrow margin, many of the 130-odd delegates voting against it.

The eleven-man council will have four members from Michigan and two from Ohio, while other automobile producing districts have been allotted one representative each. The Michigan members will be Michael J. Manning, Kelsey-Hayes Wheel Corp., Detroit; John Pickering, Pontiac Motor Co., Pontiac; Herbert H. Richardson, Fisher Body plant No. 2, Flint, and Clyde Cook, Fisher Body Corp., Lansing. The Ohio members are Thomas H. Ramsey, Toledo, and George Lehman, White Motor Co., Cleveland.

Other members of the council are: F. G. Woods, Studebaker Corp., South Bend, Ind., for Indiana and Illinois; Ed Hall of Milwaukee, for Wisconsin; Homer Martin, Chevrolet Motor Co., Kansas City, for the West, and F. C. Pieper, Chevrolet Motor Co., Atlanta, Ga., for the South. The eastern member was not elected.

Although a chairman has not been named, it is assumed that William Collins, who presided during the conference, will be elected to that position.

President Roosevelt was asked in a resolution adopted by the conference to clarify the relations of the parts industry to the producion business "either by creating a board to handle the auto parts and equipment problems, or by placing the entire jurisdiction with the present Automobile Labor Board."

Another resolution attacked company unions, declaring that managements print by-laws and literature for so-called "works councils" and coerce workers into joining them. It then requested President Roosevelt to order the Automobile Labor Board to investigate the allegations contained in the resolution.

A third resolution asserted that General Hugh S. Johnson "has modified, changed and extended the production and parts codes without giving an opportunity for the workers to present their recommendations." It demanded that the General permit the workers to consider at a public hearing the provisions of any new codes which may be instituted after September, when the present code expires.

Other resolutions condemned the Ford Motor Co. for failure to live up to the seniority rulings of the Automobile Labor Board, and asked that the board investigate the speed of production lines, job insecur-, discrimination, wage standards and unemployment problems confronting older workers.

A number of delegates to the conference were strongly in favor of the formation immediately of an International Automobile Union under the banner of the A. F. of L. thus drawing together for a common purpose all of the local automobile federal unions individually chartered by the A. F. of L. However, the setting up of a national council was agreed to by these delegates as a compromise measure on assurance by President Green that such an international union will be established by the A. F. of L. when the proper time has arrived.

The conference went on record in support of enactment by the next Congress of an unemployment and social insurance law. It passed a resolution urging the A. F. of L. to request the automobile labor board to issue a clarification of the existing ruling made on May 18 which the industry is to follow in reducing and increasing working forces. The resolution likewise asks for "such adjustments in the ruling as will make the ruling more equitable and give better protection to the workers." The conference decided to ask the A. F. of L. to take the necessary steps to develop a method whereby representatives of federal automobile unions can obtain complete data including wage scales and living costs in different motor car manufacturing areas. The reason for the collection of these data is that managers of individual plants to offset union requests for higher wages and better conditions involving extra expense often say that all the profits earned by the company are in some other plant.

Asserting that President Roosevelt had stated to the A. F. of L. representatives in conference with him at the White House on March 25, that he intended the automobile settlement to include the entire industry, the conference requested the President to issue an executive order creating a board for the Auto Parts and Equipment Division of the industry. The conference asked the A. F. of L. to take up with the Roosevelt administration the demand of Federal Labor Union No. 18956, of Flint, to come under jurisdiction of the Automobile Labor Board. Members of this union are employees of the Du-Pont Co., which makes paint and lacquer exclusively for automobiles at its Flint plant. One measure adopted by the conference requests the A. F. of L. to grant federal labor unions authority "to sponsor organization of small industries in their localities."

A resolution said to have been sponsored by local unions of Muskegon, Michigan, and demanding that a new automobile labor board of five men be appointed was defeated. This resolution specified that Dr. Wolman should be barred from acting on any future board and that Richard Byrd be removed from the present board. There apparently was a tug of war in the conference between the more radical delegates who thought that the present labor board should be censored for acting too slowly and the conservative members who wish to cooperate with the board and who recognized, as the board does, that patience and time are required in solving many of labor's problems. The conservatives won in the test of votes. The first steps to be taken following the conference will be the strengthening of the staff of union organizers in the automobile industry.

The New Plymouth Special Six

"Designed for motorists who want luxury features at lowest possible cost, plus the latest in engineering and mechanical advantages," says the maker

HOFFMAN

Group Buying Move Seen In MEWA "Study"

Basis Sought Whereby Wholesalers Can Meet Competition to Advantage

CHICAGO—The Board of Directors of the Motor and Equipment Wholesalers Association, which includes more than 200 of the prominent automotive jobbers of the United States and Canada, has authorized the association to "make a study intended as a basis for recommendations whereby jobbers may maintain themselves in a competitive position to best advantage." This decision was made at the recent meeting of that body in Chicago.

While there is, apparently, no definite connection between this new move on the part of the M.E.W.A. directors and the apparent failure of the wholesale code negotiations to more nearly fix prices and control factory-wholesaler buying relations through the controversial "Article 6" in the retailing code, the same underlying consideration is involved.

From the viewpoint of the wholesalers that consideration is: "Shall automotive wholesalers of the M.E.W.A., through regional or national group effort, use the group buying weapon to defend themselves against the price advantages enjoyed by car factory sales organizations, chain store operators and other quantity buyers among their competitors?"

While not definitely announced as such,, the M.E.W.A. move, coupled with the remarks of E. T. Satchell, its president, and the speech of B. W. Ruark, general manager, on "buymanship," left no doubt in the minds of the jobbers present that the "study" contemplated some form of group buying which might be offered to the members of the association either direct or through an independent or subsidiary agency.

New RFC Loan Rule May Spike W-O Plans

TOLEDO—With hopes for obtaining the $2,000,000 loan sought by Willys-Overland for reorganizing from the RFC waning, due to an announcement by Jesse H. Jones, chairman, relating to limitation on size of loans, efforts may be made to ask authority of the Federal courts to manufacture another allotment of cars.

David R. Wilson, receiver and president, said every effort will be made to reopen the plant, which has now completed its 7500 allotment of cars authorized by the court. The creditors' committee met and indicated they will do anything within reason to aid in a new manufacturing program.

A Synthetic Rubber Tire

A. L. Freedlander (right), vice president and chemical engineer of Dayton Rubber Manufacturing Co., discussing tire made of DuPrene, a DuPont product, with J. A. MacMillan (left), president of the company

Hot Water Heater Supplement Allows Cost Recovery Despite Recent NRA Ruling

WASHINGTON—Despite NRA's recent ban on cost recovery and other price regulating provisions in future codes (A. I., June 16, 1934, page 732), the automobile hot water heater manufacturing supplement to the APEM code approved this week by General Johnson contains a bar against sales below cost. Since this is the first APEM supplement to receive NRA approval it is attracting considerable attention. There is doubt, however, as to whether its provisions may be taken to establish a precedent for other supplements since at the opening of the hearings on supplements for 14 other product groups being held here this week, Deputy Administrator Everitt announced that their pricing provisions would have to conform to the new NRA policy on price controls.

The hot water heater supplement bars sales below cost as determined by approved uniform accounting methods which all members are required to use in determining their costs. However, members may sell below cost to meet the prices of a competitor. In an emergency, the administrative committee for the supplement may determine the lowest reasonable cost and with the approval of NRA establish it as the floor below which sales may not be made during the emergency.

Open-price posting is provided in the supplement and new prices filed do not become effective until after a minimum waiting period of 10 days. Approval of this waiting period is occasioning some surprise in view of the fact that for some months NRA's policy has been to require that filed prices become effective immediately.

Under volume allowances provision is made for establishing a rebate and bonus schedule. Rebates and bonuses for volume allowed in 1933 are to be reported to the administrative committee. The administrative is to select from these reports the highest rebate and bonus sales and propose a composite schedule of rebates and bonus. The schedule is to be reported to the code authority and the administrator. After approval by both the code authority and the administrator no member will be permitted to extend any rebate or bonus at a rate higher or on more favorable terms than are provided in the composite schedule.

Jobbers Ask Decision On Code Article VI

NSPA Appeals to Johnson For Favorable Action; I. D. Everitt Has Report

WASHINGTON — Appeal has been made to NRA Administrator Johnson by the National Standards Parts Association to give a favorable decision on Article VI of the Wholesale Automotive Code which authorizes a form of resale price maintenance. While the provision, which many jobbers believe to be the backbone of the code, has been in the code since its approval it has never been operative.

The report was made some time ago and subsequently turned over to the Research and Planning Division of NRA. The latter has completed its study and the report now is in the hands of Deputy Administrator I. D. Everitt. Efforts are being made to get Deputy Everitt to release the report and his findings as soon as possible. Some time will probably be required before this is done inasmuch as it is expected a number of conferences will first have to be held.

Management and Labor Meet

William O'Neil, president of General Tire Co. (center) informally conferring with Rex Murray (right) president of the union, on the company's grounds during the strike. Office workers were turned back by the 1500 pickets and complete suspension of activities resulted

NRA Bars APEM Price Plans

(*Continued from page* 787)

Order Association of America protested the open price provisions in the proposed codes and B. W. Ruark of the Motor and Equipment Wholesalers Association, indicated that he would file a brief setting forth objections to provisions in the wheel and rim and oil filter supplements.

Representing the carburetor group on the hearing on the carburetor supplement were H. C. Tillotson, Tillotson Mfg. Co.; B. W. Wescott, Zenith; M. E. Chandler, Bendix-Stromberg, and O. I. Larson, Marvel. Briefs relative to the fair trade practice divisions of this supplement were filed by Charles Zimmer speaking for Hygrade Products Co., the Langsen Kamp-Linkert Car Co. and the Magneto Winding Co.

The gasket supplement was presented by C. C. Secrist, Victor Mfg. & Gasket Co. P. L. Barter represented McCord Radiator & Mfg. Co. at this session. Mr. Barter also appeared for the radiator manufacturers when the supplement for that group was heard. E. B. Mecorney, Harrison Radiator, and G. C. Steffy, Faber-Schneider Radiator Co., also attended the radiator session.

Acting in the interest of wholesalers B. W. Ruark of the M. E. W. A., and O. B. Gault of the N.S.P.A., protested against the provisions on the classification of customers in both the gasket and carburetor codes. Provisions of the gasket code were also attacked by C. B. Hurrey of the National Automotive Parts Association. In addition, protests against the gasket and radiator supplements were registered by the NRA Consumers' Advisory Board and the Research Planning Division. The specific provisions cited by these NRA agencies had to do with volume rebates, advertising allowances, and display equipment sections.

The electric lighting and reflecting devices supplement was presented by H. R. Kerans of K. B. Lamp Co. Exemption of "Class A" members whose products are sold as orginal equipment from certain fair trade practice divisions was attacked by John W. Ogren, speaking for E. Edelmann Co., B. W. Ruark of the M.E.W.A., and O. B. Gault of the N.S.P.A. The provisions were defended by Arthur G. Phelps of Delco-Remy. Specific suggestions as to possible changes in these sections of the supplement were offered by numerous witnesses, including C. J. Kistler, of Monteith Bros. Co.; Charles Neitman, of the Manhattan Insulated Wire Co.; L. E. Fogel, Automotive Specialty Co.; and M. P. Ferguson, Eclipse Machine Co. E. Fife, of the Standard Motor Products Co., also testified. R. S. Walker, of the Walker Armature Co., and Mr. Ogren assailed the branding and labeling provisions following a statement by H. B. Hahn, of the Cleveland Armature Co., in support of them. The Consumers' Advisory Board endorsed the sections on inaccurate advertising, imitation of trade marks, etc., and stressed the necessity of protecting car owners against the substitution of rebuilt or reconditioned products. Briefs on this supplement were filed by the Fulton Co., the Cresent Auto-Cable Co., Apollo Magneto Corp., American Bosch, Cuno Engineering and the Mail Order Association.

Steel Labor Board Named

WASHINGTON, June 28 — Acting under the authority conferred on him by the joint labor resolution passed by the last session of Congress, President Roosevelt today appointed a National Labor Relations Board for the iron and steel industry consisting of three impartial members. The members are Judge Walter P. Stacy, North Carolina, Admiral Henry F. Wiley, U.S.N. (retired), and James Mullenbach, Chicago.

The President authorized the Board to hear and determine alleged violations of Section 7A, mediate labor questions, to serve as a board of voluntary arbitration and by secret ballot to conduct labor elections to determine who are the representatives of the workers for collective bargaining.

Inquiry Begun Into NRA Ban On Ford Co.

WASHINGTON—A subcommittee of the House Committee on Military Affairs is conducting an inquiry into the NRA crack down policy against the Ford Motor Co. Answers to three questions in particular are sought: is barring of Ford justified; has the ban kited prices on automobiles and trucks, and, if so, what has the Government done about the matter of higher prices.

The present inquiry has been begun through the efforts and activity of Representative Kvale, Minnesota Farmer-Laborite, with strong backing from Representative Goss, Connecticut Republican. The opinion of several persons interested in the inquiry is that the Government has adopted a petty attitude toward the Ford Motor Co. It is conceded that Mr. Ford is living up to all provisions of automobile code, although not a signatory.

Trailer Code Approved, To Be Effective July 11

WASHINGTON—The NRA has approved the code for the trailer manufacturing industry, becoming effective July 11. In approving the code, however, General Johnson stayed Article VII, Section 5, which prescribes a waiting period between the filing with the Code Authority and the effective date of revised price lists (pending further order of the Administrator) and also stays Section 6 of the same article providing that prices in no event shall be less than the individual member's cost, for 60 days, unless during such period good cause is shown why such stay should not be made permanent.

Federal Names Costello Assistant Sales Manager

DETROIT—W. W. Costello has been appointed assistant sales manager of the Federal Motor Truck Co., according to an announcement from J. F. Bowman, vice-president in charge of sales. Mr. Costello has been associated with the Federal organization for more than six years, always serving in the sales department.

AFL Organizes Locals in Various Chrysler Units

DETROIT—Organization of A. F. of L. locals for various Chrysler units has been completed with the election of officers. At the organization meeting the following resolution was adopted by the union:

WHEREAS, Experience of the last few months has taught us that in order to fight the powerful Automobile Chamber of Commerce, we must have a strong Industrial Union of Automobile Workers, National or International in scope. Therefore, be it

RESOLVED, That Local Union 18,313, A. F. of L., hereby goes on record instructing its delegates and officers to work for an International Union of Automobile Workers to be chartered by the A. F. of L. and to have jurisdiction over all workers in the automobile plants of the United States and Canada.

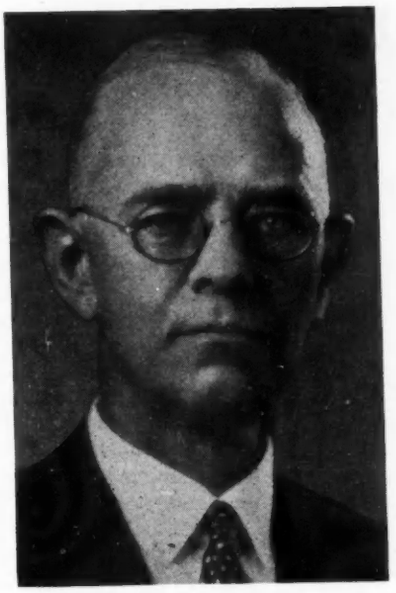
AMENDED, That our delegates be allowed to vote to accept the executive council with authority until we can get an international charter.

Service Pins Presented To 681 Thompson Workers

CLEVELAND—Service pins in bronze, silver and gold signifying five to 25 years of continuous employment were presented recently to 681 employees in the Detroit and Cleveland plants of Thompson Products, Inc. F. C. Crawford, president, pointed out that the emblems represent an average of nine and one-half years

service and a collective manufacturing experience of over 60 centuries.

Nine employees with the company over 25 years assisted in the presentation ceremonies after receiving gold pins set with diamonds. All who received pins were organized into an "Old Guard Club" which will promote social and welfare activities of the company. E. C. Prahst, a foreman at the Thompson Products main plant in Cleveland, is the oldest employee in point of continuous service. He has worked for the firm 33 years.



A. V. (Art) Comings

Arthur Vernet Comings

DETROIT—Arthur Vernet Comings, whose informative and inspirational articles endeared him to thousands of automotive retailers when he was editor of Automobile Trade Journal (1924-1929), died here June 26. At the time of his death he was editor of several merchandising services to dealers and salesmen of the Plymouth Motor Car Co.

"A. V." entered the editorial activities of the Chilton Co. shortly after the World War as a roving editor, and for several years visited all sections of the United States studying dealer operations and reporting them.

He brought to his job a newspaper background absorbed in middle western cities starting in Rockford, Ill., when a boy. Later he owned and edited a motor boating paper for the Pacific Northwest, with headquarters in Seattle.

Comings, an ardent motor boat enthusiast, retired in 1929 to spend his remaining days at Indian River, Michigan, "doing the things I've wanted to do all my life, in the way I want to do them."

But he had "printer's ink in his blood." In a few months he was contributing to Automobile Trade Journal and other automotive and motor boating papers as a "free-lance." Later, when his old friend of early N.A.D.A. days, Harry Moock, became Plymouth sales manager, "A. V." joined him.

He is survived by his widow, Mary Comings.

Angle Joins Winton

CLEVELAND—Glenn D. Angle, who has been conducting a consulting engineering practice in Cincinnati, has joined the Winton Engine Co. of Cleveland as divisional engineer in charge of development work.

Steel Market Bare of New Auto Orders

A.I.S.I. Reports Rate Ingot Output for Week 44.7% Of Theoretical Capacity

NEW YORK—With the possible exception of a few scattering odds and ends of orders, the steel market this week was destitute of fresh commitments from automotive consumers. So far buyers are not showing the slightest interest in covering their third quarter steel requirements over and above the tonnages they have in their own warehouses and that which is now en route to their plants. With nothing to be gained from taking time by the forelock, they will order steel as they need it.

While steel producers, in the light of higher production costs, look upon downward price revisions later in the year as utterly out of the question, buyers of an empirical slant of mind hold fast to the belief, barring entirely unforeseeable circumstances, that the only way for steel sellers to get another large-scale buying movement to take shape is to offer consumers the sort of inducement that will prompt them to place orders before the material is urgently needed.

All of the current week's steel indices reflect the downturn in activity. The American Iron and Steel Institute reports the rate of steel ingot output at 44.7 per cent of theoretical capacity, compared with 56.1 per cent last week. Mahoning Valley plants are reported operating at about 48 per cent. Finishing mills, with the exception of a few plants that have apportioned their automobile sheet business, so as to keep all departments evenly busy up to the end of the week, have whittled down their operating rates. Some rolling mills have announced suspensions of certain units for an indefinite period. Shipments of billets and sheet bars to non-integrated rolling mills have tapered off. With all that, confidence in a gradual pick-up is not wanting and is reflected in a slight improvement in the scrap market, still looked upon as barometrical of the steel market outlook.

Pig Iron—While reports from the Middle West mention that, due to overbuying, some melters are permitting the quarter to pass without taking all of the iron due them on contracts, automotive foundries in general have been taking all the iron for which they contracted.

Aluminum—A threatened strike of unionists in the aluminum industry would, it is thought in the trade, have little effect on market conditions. Warehouse stocks of the metal are abundant for a long time to come. Nor is there any likelihood of inconvenience to buyers of fabricated aluminum products resulting from the threatened walk-out. Quotations remain unchanged.

Copper—Conditions under the new Code Authority regulations are becoming more orderly. With secondary copper sales quotas allotted to custom smelters establishing more satisfactory tonnage limits for them, a more settled condition prevails. "Blue Eagle" metal is unchanged at 9 cents, Connecticut Valley basis, the "outside" market being quoted at 8¼ @ 8½ cents.

May Production For U. S. and Canada 351,802 Units, 5.8% Drop From April

WASHINGTON—May production of cars and trucks in the United States and Canada totaled 351,802 units, a loss of 5.8 per cent from April but a gain of 57 per cent over May, 1933. The May output lifts the total for the first five months to 1,474,442 units which is 91 per cent larger than in the same period last year.

Passenger car output in May amounted to 290,269 units representing a decline of 4.5 per cent from April. Truck production decreased somewhat more sharply, the total of 61,533 being about 10 per cent under the previous month.

Detailed comparisons are given in the following table:

PRODUCTION—U. S. AND CANADA

	Passenger Cars	Trucks	Total Motor Vehicles
May, 1934....	290,269	61,533	351,802
April, 1934 ..	304,482	68,626	373,108
May, 1933....	190,005	34,223	224,228
5 Mos., 1934..	1,195,126	279,316	1,474,442
5 Mos., 1933..	658,965	115,261	774,226

FTC Denies Motion To Dismiss Goodyear Case

WASHINGTON—The Federal Trade Commission last week denied the motion of counsel for the Goodyear Tire and Rubber Co. to dismiss the Commission's complaint against the company. The complaint charges price discrimination in the Goodyear company's tire contract with Sears, Roebuck and Co., in violation of Section 2 of the Clayton Act.

Counsel for the Goodyear company sought to have the complaint dismissed on the ground that evidence adduced at the Trial Examiner's hearings held in Akron, Ohio, Washington, D. C., and many other cities, had failed to show the violation of the Clayton Act charged in the complaint.

As a result of the Commission's action, resumption of the taking of testimony in this case took place at Akron, Ohio, last Monday, when the presentation of testimony in behalf of the respondent begun. Trial Examiner John W. Bennett presided at the hearings, and the Commission was represented by Attorneys E. F. Haycraft and P. B. Morehouse.

Michigan Voters Seek Lower Automotive Taxes

LANSING—Petitions bearing approximately 850,000 signatures which will assure a vote in the fall elections on constitutional amendments limiting weight tax on automobiles and the state gasoline tax were brought to Lansing last week by a motorcade sponsored by the Automobile Club of Michigan.

The petitions, asking that the weight tax on automobiles be limited to 35 cents per hundred-weight and that the gasoline tax be reduced to 2 cents a gallon, were presented to Frank Fitzgerald, Secretary of State.

New Chrysler Magazine

DETROIT—The first edition of the new Chrysler house organ "Chrysler Motors Magazine" has made its appearance. Published by the Chrysler Industrial Association, the magazine is mailed to every man and woman employed in the various Chrysler plants. The first edition run was 70,000 copies.

De Soto Places Largest 1934 Automobile Order

DETROIT—The largest automobile order to date this year has been placed by dealers of the De Soto Motor Corporation. They have ordered 250,000 tiny all-rubber Airflow cars from a Mansfield, O., toy manufacturing company. The little cars are being given to prospective new car buyers as part of an aggressive sales campaign.

Ford Develops New Radio Exclusively for V-8's

DEARBORN, MICH.—A new-type automobile radio receiver with several unique features in design and installation, has been developed for all Ford V-8 cars, and will be offered exclusively by Ford dealers as extra equipment, according to announcement by the Ford Motor Company.

This new Ford receiver does not interfere in any manner with leg room in the front compartment of the Ford V-8, or with package compartments in the car. Neither does it interfere with the installation of a hot water heater, or other equipment.

Controls on the set are installed in the center of the instrument panel, convenient either to the driver or passenger. The receiver is a six-tube superheterodyne of new design, with a special-built vibrator.

Truck Registrations Lag, ATA Report Shows

WASHINGTON—Out of nearly 2,000,000 in this country less than 100,000 had been registered up to and including June 22, the last date for which figures are available. The actual count showed 93,860 truck owners and operators had complied with the code provision.

The A.T.A. bulletin announced that committees and individuals will be assigned the job of mopping up, under instructions issued by the national code authority to state code authorities. The registration time expired Thursday, but it expected that some offices in the larger cities will be kept open for late registrations throughout the coming week.

Tempered Rubber Exhibit at Chicago

Dr. B. J. Lemon, in charge of U. S. Rubber Co.'s exhibit at A Century of Progress, pointing to a section of tempered rubber which is claimed will outwear steel or concrete

Bendix Carburetor School Tours West

SOUTH BEND—The Bendix carburetion "school" or "carburetor clinic," presided over by A. H. Winkler, motor fuel system technician, is going west, according to an announcement by O. C. Holaday of the Bendix Products Corp.

Nigg and Proctor Join NSPA Staff

Fill Secretaryships of Jobbers', Manufacturers' Groups in Association

DETROIT—Appointment of H. N. "Herb" Nigg and R. W. "Doc" Proctor to executive positions on headquarters staff of the National Standard Parts Association has been announced by E. P. Chalfant, executive vice-president. Mr. Nigg has been named secretary of the jobbers' division and Mr. Proctor has been appointed secretary of the manufacturers' division.

The new secretary of the jobbers' division has been connected with the automotive industry almost since its inception, first as a parts manufacturer and later as president of the Piston Service Co., a Detroit parts wholesaling concern. He has served on all major N.S.P.A. committees as well as on the board of directors. He is a member of the Wholesale Code National Administrative Committee.

H. N. (Herb) Nigg

R. W. (Doc) Proctor

"Doc" Proctor also has been connected with the industry for many years. He was graduated in 1912 as mechanical engineer from Cornell University and subsequently was connected with the National Lamp Works, Black and Decker, Van Dorn Electric Tool and Parkin Spark Plug. He has been an active and prominent figure in automotive association work for many years, having served on the merchandising committee and the board of directors of the former Automotive Equipment Association. He was also chairman of the merchandising committee of the Mill Supply Jobbers.

May Manufacturing Activity Declined

Industrial Conference Board Reports Payrolls Up; Worked Hours Drop

NEW YORK—Analysis of earnings, hours, employment and payrolls for May indicate that manufacturing activity, measured in total man-hours worked, declined 0.8 per cent from April; total payroll disbursements increased 0.2 per cent, and the total number of persons at work increased 1.1 per cent according to the National Industrial Conference Board.

Average hourly earnings for May rose from 57.9 cents to 58.7 cents, average number of hours worked dropped from 36.1 to 35.4. This brought a lowered average weekly wage from $21.00 to $20.81 during the same period. This decline in actual weekly earnings together with a 0.3 per cent increase in living costs make the real rate of weekly earnings 1.1 per cent lower in May than April.

Although total man-hours in the combined industries declined, there were a number of industries in which increases in man-hours were recorded. These industries were paint and varnish, iron and steel, meat packing, heavy equipment, book and job printing, lumber and millwork, electrical manufacturing, machines and machine tools, hardware and small parts, leather tanning, paper and pulp, foundries and paper products. The increases ranged in the order named from 12.1 per cent in the paint and varnish industry to 0.4 per cent in the manufacture of paper products.

A comparison of conditions in May, 1934, with those in May, 1933, shows increases of 29.6 per cent in average hourly earnings, 23.6 per cent in average weekly earnings, 13.5 per cent in real weekly earnings, 46.0 per cent in employment, 37.5 per cent in total man-hours, and 80.7 per cent in payroll disbursements. Average hours of work per week, on the other hand, were reduced 5.9 per cent.

New Company Takes Over Perfex Corp. Business

MILWAUKEE—The Perfex Radiator Co., a newly incorporated organization, has taken over the business of the Perfex Corp., Milwaukee, manufacturing radiators for trucks and tractors. These lines will be continued with additional items being developed in a new research laboratory.

Julius K. Luthe, prominent inventor and engineer, has become president and treasurer; R. W. Wilson, vice-president; and L. J. Burlingame, secretary. Mr. Luthe was head of the former Time-O-Stat Corp., Milwaukee.

Stewart-Warner Sales Up

CHICAGO—An increase of 154 per cent in the consolidated sales of the Stewart-Warner Corporation and its subsidiaries during the first five months of this year, compared with a like period of 1933, is reported by Joseph E. Otis, Jr., president. A gain in sales of at least 100 per cent over last year has been shown by every division of the company. Sales of radios, refrigerators and automotive lines by the parent company are reported to have been more than 300 per cent above last year.

Brake Test Required on Altered Trucks in Penna.

HARRISBURG—On and after July 1 the Pennsylvania Bureau of Motor Vehicles will require all trucks altered to increase the capacity load to pass a brake test to determine the efficiency of the braking system with the increased load. The tests will be in charge of the State highway patrol.

Heretofore factories and direct factory representatives have been permitted to approve alterations to standard chassis for reclassification purposes. Under the new rules factory representatives will be required to fill out Form T-18A and make an affidavit that the alterations have been tested and that the truck has sufficient braking power to handle the increased load with safety. No approval of reclassification will be granted until the state test has been taken and passed satisfactorily.

Twin-Flex Moving Plant

MILWAUKEE—Twin-Flex Co. of Detroit, manufacturing third axle units for light commercial cars, is moving its plant and offices to Milwaukee at 2131 South Fifty-fourth Street, where it expects to resume production before the end of June. The concern has nation-wide distribution as well as export trade, according to George Mueller, sales manager. He described the unit as designed to improve weight distribution and increase tire life.

New Bendix Distributor

SOUTH BEND—The Bendix Products Corp. announces the appointment of the Electric Equipment Company of Los Angeles as distributor for the entire line of Bendix products in southern California.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business continued to make a good showing last week, despite the fact that this is the time of year when a slackening usually sets in. Reports from practically all sections of the country were encouraging. A good level of retail sales was maintained, although there was a falling off in some seasonal lines.

Commodity Prices Steady

The Guaranty Trust Company's index of wholesale commodity prices on June 15 stood at 53.0, as against 53.5 a month earlier and 47.4 a year ago. The company's index of business activity for May stood at the preliminary figure of 74.2, as against 73.1 for April and 62.0 a year ago.

Car Loadings Gain

Railway freight loadings during the week ended June 16 totaled 617,649 cars, which marks an increase of 2048 cars above those during the preceding week, an increase of 24,890 cars above those a year ago, and an increase of 99,251 cars above those two years ago.

Electric Output Up

Production of electricity by the electric light and power industry during the week ended June 16 was 5.5 per cent above that in the corresponding period last year.

Construction Increases

Construction contracts awarded in 37 eastern states during May, according to the F. W. Dodge Corporation, had a value of $134,445,700, which marks an increase of 2 per cent above those during the preceding month and compares with only $77,171,700 a year ago.

Lumber Falls

Lumber production during the week ended June 16 continued to fall and was at about the level prevailing last January. The decline was the result of seasonal forces, hand-to-mouth buying on the part of retailers, and the prolongation of the longshoremen's strike.

Gain in Crude Oil

Average daily crude oil production for the week ended June 16 amounted to 2,609,450 barrels, as against 2,571,400 barrels for the preceding week and 2,611,850 barrels a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended June 23 stood at 78.0, a new high for this year, as against 77.4 the week before and 75.9 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended June 20 showed practically no changes in holdings of discounted bills, of bills bought in the open market, and of Government securities.

American Bus Makers Gain by Ceylon Ruling

WASHINGTON—American bus manufacturers should benefit from a recent ruling by the traffic department of the Ceylon police, according to a dispatch to the Department of Commerce by Vice Consul Brookholst Livingston, stationed at Colombo.

According to the ruling the Registrar of Motor Vehicles has ordered that further precautionary measures are to be taken to keep derelict buses off the highways. In the future quarterly inspections of vehicles will be required in place of the semi-annual inspection. The elimination of derelicts from the highways should prove advantageous to American manufacturers inasmuch as the majority of the buses in operation today are American made and it is anticipated, Mr. Livingston stated in his report, that the demand for new vehicles will be directed principally toward units of the same country of origin.

NACC Group Discusses Increased Employment

WASHINGTON—Ways and means of increasing employment here through improvement of foreign trade were discussed last Thursday by members of the export committee of the National Automobile Chamber of Commerce with interested government officials. Robert C. Graham, chairman of the committee, presided at the meeting.

Tariffs ranging 20 per cent to 540 per cent of the price of the goods, blocked currencies, and quotas were among the trade deterrents noted. The group commended passage of the President's Reciprocal Tariff Act.

Attending the sessions were: Robert C. Graham, vice-president, Graham-Paige Motors Corp.; B. C. Budd, vice-president, Packard Motors Export Corp.; A. L. Frank, vice-president, Studebaker Pierce-Arrow Export Corp.; A. C. Germann, export manager, Hudson Motor Car Co.; Edgar W. Smith, vice-president, General Motors Export Co.; W. F. Thatcher, assistant to the president, Chrysler Export Corp.; R. S. Wiley, export manager, Auburn Automobile Co.; George F. Bauer, National Automobile Chamber of Commerce, New York, and Pyke Johnson, vice-president, National Automobile Chamber of Commerce, Washington, D. C.

Bantam Appoints 3 New Sales Representatives

SOUTH BEND—The Bantam Ball Bearing Co. announces the appointment of G. A. Ashton Co., St. Paul, Minn., as representative for the states of Minnesota, North and South Dakota, Montana, Nebraska, Iowa and Wisconsin. Robert Cannon has been appointed company representative for automotive replacement bearings for western Missouri and Kansas. F. D. Clark has been named district sales engineer for the company in northwestern Ohio and southeastern Michigan.

Dr. A. H. Williams Named ALB Executive Secretary

DETROIT—Dr. Leo Wolman, chairman of the Automobile Labor Board, has announced the appointment of Dr. Alfred H. Williams as executive secretary of the board. Dr. Williams' duties will keep him in the field a considerable portion of the time. The new appointee is professor of Industry at the University of Pennsylvania and chairman of the Department of Geography and Industry in the Wharton School of the University.

"Old Timers" Reunion

CHICAGO—A reunion of "old timers" in the automobile business was held this week at A Century of Progress. The veterans attended the exposition in a body and saw the transportation pageant Wings of a Century. It is in this spectacle that the great collection of antiquated models of automobiles will be seen operating under their own power.

Firestone Receives Degree

Dr. William Foster Pierce (left), president of Kenyon College, conferring honorary degree of Doctor of Laws upon Harvey S. Firestone (right) at annual commencement exercises of the institution. Mr. Firestone later delivered the address at the Alumni Luncheon

MEWA Officers to Make Trade Conditions Study

CHICAGO—In recognition of greater need for efficient operation on the part of jobbers in order that they may operate profitably under more intensified competitive conditions, the board of directors of the M.E.W.A., at its meeting at Chicago, June 13, authorized officers of the association to make a study intended as a basis for recommendations whereby jobbers may maintain themselves in a competitive position to best advantage.

Announcement to this effect was made at M.E.W.A. Summer Conference of Regional Association Representatives, occurring June 14, 15 and 16, at the Edgewater Beach Hotel, Chicago.

New GM Questionnaire Going to Customers

DETROIT—"Your Car as You Would Build It" is the title of the latest questionnaire being mailed out by the Customer Research Staff of General Motors. The new questionnaire follows the pattern of those sent out previously in general style and covers body types, radiator designs, louvers, fender skirts, wheels, tires, spare wheel mounting, streamlining, seat cushions, colors, trimmings, adjustable front seats, dash compartments, ventilation, synchro-mesh transmissions, number of cylinders, automatic choke, coincidental starter, brakes, knee action, and general characteristics.

U. S. Court Fines Nevada RR. $500 on Boycott Charge

CARSON CITY, NEV.—A fine of $500 was levied against the Nevada Northern Railway Co., operating between Cobre and Ely, Nev., by the U. S. District Court on a charge of starting a boycott against merchants using motor truck service, according to the N.A.C.C.

In addition to the fine imposed upon the railroad, its manager was fined $50 and 7 other employees $1 each. The defendants pleaded nolle contendre, throwing themselves upon the mercy of the court. It is felt the outcome of this case will have a nation-wide effect in curbing unjust attacks on motor truck transportation in the future.

Plymouth Uses Speedway and Stage Stars in Movie

DETROIT—Harry Hartz, Billy Arnold and Barney Oldfield, speedway stars, are taking leading parts in the sound movie, "Death Cheaters Holiday," now in production for the Plymouth Motor Corporation. Supporting this cast are James McBride, Broadway actor, and Al St. John, comedian. Many of the "shots" for the picture were made during the recent 500-mile race at Indianapolis.

Peerless Motor Corp. Turns to Brewing Ale

CLEVELAND—The final step in the passing of the Peerless Motor Car Corp. from the automobile scene was taken on June 15, when the company went formally into production on Carling's Canadian Ale, a drink hitherto made only in Canada. The $1,500,000 equipment was on view for the first time at a reception, by invitation, from 4 to 10 p. m. Production of the ale is under the supervision of Carling Breweries, Ltd., of London, Ontario, which has been in the business since 1840.

From clothes wringers to bicycles to motor cars to ale is thus the procession of businesses through which this manufacturing company has passed. The Peerless Motor Car Corporation becomes the Peerless Corporation, and its subsidiary, the Peerless Company, becomes the Brewing Corporation of America, which now occupies a large part of the extensive plant at Quincy Avenue and East Ninety-third Street.

May Payroll Per Vehicle Produced Four Points Over April, Index Shows

WASHINGTON—Despite a decline from 109 in April to 98 in May in the Federal Reserve Board index of automotive production, the index of the number of workers employed by the industry decreased only one point—from 115 to 114. The smaller decrease in employment was, of course, due to work-sharing as is evidenced further by the fact that the index of employment per vehicle produced increased from 105 to 116.

Work-sharing means a reduction in the hours worked per week and it is not surprising therefore that payrolls declined more than employment although not as much as production. The automotive payroll index in May stood at 100 as compared with 107 in April while the index of pay per worker went from 93 in April to 88 in May. If these indexes were adjusted for the purchasing power of the dollar, however, it would be found that in both months the real wages of the automotive worker were above the base 1923-1925 period.

The index of payroll per vehicle produced is a rough measure of the industry's labor costs, and it shows an increase from 98 in April and from 68 in May, 1933, to 102 in May of this year. The April-May 1934 increase in this index is probably due largely to the decline in production which, of course, affects manufacturing efficiency adversely.

As the following table shows all the indexes were far above May, 1933:

Automotive Production, Employment and Payrolls

(Federal Reserve Board Indexes 1923-1925 Monthly Average—100

	May, 1934	April, 1934	May, 1933
(Adjusted for Seasonal Variation)			
Production	78	85	50
Employment	104	109	49
(Without Seasonal Adjustment)			
Production	98	109	63
Employment	114	115	54
Payrolls	100	107	43
Derived Indexes			
Pay per worker	88	93	80
Pay per car produced	102	98	68
Employment per car produced	116	105	86

Nash Asks Right To Carry Unemployment Contributions as Bookkeeping Reserve

MADISON, WIS.—Nash Motors plans to use the Standard Unemployment Benefit Plan to comply with the Wisconsin Unemployment Compensation Act, the first of its kind in this country, which goes into effect July 1, 1934. The company has asked for permission to carry its contributions to the unemployment fund as a bookkeeping reserve and anticipates that its request to do so will be approved by the State Industrial Commission which is charged with administration of the Act.

The plan is in the form of a five-year contract to which the employer, the employees and the State are parties, and it may not be abandoned during that period although it may be modified under certain conditions. Initially contributions by the employer begin at 2 per cent of his payroll which is defined to include all compensation paid to employees except salaries or wages of more than $300 per month and remuneration of $1,500 or more per year which is covered by a guaranteed contract.

Unemployed workers become eligible for benefits under the plan one year after the employer starts making contributions to the fund and consequently during the first year all contributions will go to build up the reserve. So long as the reserves per worker are less than $55, fund contributions continue at 2 per cent of payroll. When the reserve per worker lies between $55 and $75, the rate drops to 1 per cent and when the reserve reaches $75 per worker, the employer is required to make no further contributions so long as the reserve is at or above that figure.

As required by the law, the plan provides weekly unemployment benefits of 50 per cent of the worker's full-time weekly wage, with a maximum of $10 and a minimum of $5 weekly. Payments are made for a maximum of ten weeks in any one year provided the reserve fund is adequate, the employer's liability being limited to the amount of money in the reserve. Whenever the reserve amounts to $50 per worker or more, full benefits are paid. However, for each $5 the reserve drops below the $50 mark, maximum weekly benefits are reduced by $1 for each $5 decrease in the reserve. For partial unemployment the benefit payments are determined by subtracting the eligible employee's actual wages for the week from the weekly benefits to which he would be entitled if he had been totally unemployed.

Benefit payments begin after a two-week waiting period, except that no more than two weeks of waiting shall be required during any consecutive 52-week period if the worker becomes unemployed more than once. Payments are made to workers who lose their jobs through no fault of their own; acts of God, fire, strikes, etc., being excepted. Moreover no benefits are payable if a worker refuses suitable employment except where the job is open as a result of a labor dispute.

Under the bookkeeping reserve option which Nash expects to adopt, the fund, even though collateralized in whole or in part, is not affected by appreciation or depreciation of the collateral. With this option, the employer absorbs any profits or losses. Administrative and record-keeping expenses may not be charged to the fund. Benefit payments are made by the employer at his office.

In addition to the bookkeeping reserve option, employers also have under this plan the alternative of paying their contributions to the State or of trusteeing them with a trust company. Under all plans, contributions made by employers are segregated into separate accounts and each applies only to the individual employers liability, except where groups of employers choose to pool their funds and liabilities.

Bulletin No. 2 on Unemployment Compensation published by the Industrial Commission of Wisconsin, Madison, Wis., provides comprehensive information on the law and its workings for those who are interested in its details.

WAUKESHA, WIS.—The Waukesha Motor Co. plans to use the Standard Unemployment Benefit Plan (outlined in foregoing report on the Nash Co. plans) to comply with the Wisconsin Unemployment Compensation Act. It has applied for permission to trustee its contributions to the fund with its local banking connections.

A.S.T.M. Nominations For '34-'35 Announced

PHILADELPHIA — The following nominations for officers of the American Society for Testing Materials for 1934-1935 are announced. Official notification of election will be made June 26 at the A.S.T.M. annual meeting.

The nominees are: President, William H. Bassett, metallurgical manager, The American Brass Co.; vice-president, H. S. Vassar, laboratory engineer, Public Service Electric and Gas Co.; Members of Executive Committee: H. A. Anderson, metallurgical engineer, Western Electric Co., Hawthorne Works; H. J. Ball, professor of Textile Engineering, Lowell Textile Institute; W. M. Barr, assistant to executive vice-president, Union Pacific Railroad Co.; L. S. Marsh, manager, Department of Inspection and Metallurgy, Inland Steel Co., and J. B. Rather, in charge, general laboratories, Socony-Vacuum Corp.

U. S. Leads World in Total Highway Mileage

WASHINGTON — The United States with 3,042,780 miles of highways greatly outranks any other world political subdivision in this respect being well in advance of Russia, the second-ranking country, with a recorded 1,682,109 miles of highways, according to a study of world highways made public by B. P. Root, Automotive-Aeronautics Division, Department of Commerce. The 145 countries and political subdivisions covered by the study are shown to have an aggregate total of 9,152,282 miles of highway.

Japan, with 635,399 miles of highways, is third, followed in order by Australia with 460,103 miles of highways; France, 406,090 miles; Canada, 398,320 miles; British India, 225,280 miles; Germany, 216,674 miles; United Kingdom, 176,791 miles; Poland, 140,980 miles; Argentina, 137,177 miles; Union of South Africa, 111,336 miles; and Italy, 105,458 miles.

CALENDAR OF COMING EVENTS

SHOWS

American Transit Assoc., Cleveland, Ohio ..... Sept. 22-27
Cleveland (Automotive Service Industries) ..... Nov. 19-23

MEETINGS

American Society for Testing Materials, Atlantic City, N. J. ..... June 25-29
American Chemical Society, Cleveland, Ohio ..... Sept. 10-14
American Welding Society, New York City ..... Oct. 1-5

ANNUAL MEETINGS

Natl. Assoc. of Motor Bus Operators, Cleveland ..... Sept. 21-22
Natl. Safety Council, Cleveland, O., Oct. 1-5

CONVENTIONS

American Society for Metals, New York City ..... Oct. 1-5
American Transit Assoc., Cleveland ..... Sept. 24-27
International Foundry Congress, Philadelphia ..... Oct. 22-26
American Foundrymen's Assoc., Philadelphia ..... Oct. 22-26
National Foreign Trade Council, New York ..... Oct. 31-Nov. 2

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y. ..... Dec. 3-8

JUST AMONG OURSELVES

More New Models Under the Code

CAR prices and models have been flashing through the motor news with bewildering variation in recent weeks. Prices went up early in April to cover increased costs and came down in June to stimulate lagging sales.

An economic stroboscope would be needed to permit continuously accurate vision on all the gyrations.

The more the maximum used car provision of the dealer code is enforced, the greater will be the increase in speed and character of changes in prices, discounts and models.

Manufacturers, as well as dealers, have always had a passion for immediate profits. Probably they always will. Flexibility in merchandising methods is required to produce immediate profits many times a year. Establishment of maximum used car allowances eliminates the chief ever-present element of flexibility in automobile marketing, because the code requires also that new car delivered prices be maintained.

Previously dealers could stimulate business at their own expense by over-allowing on used cars or by cutting the price on new cars. Now only the factories can cut the price, and rebates are required unless a new model is pending. This shifts some burden from the dealer to the factory, but also decreases overall merchandising flexibility.

With individual dealer action on new and used car prices limited rigidly, every other item in the selling scheme assumes a new tendency to change oftener. Squeeze the balloon at one place and it bulges out at others.

* * *

Ewald Defines Advertising's Place

"ADVERTISING is third in importance in the scheme of a successful business."

To record the fact that this remark comes from one of the leading advertising executives of the country, who has won his highest fame through automotive channels, is to give emphasis to the growing importance of advertising thinking as a factor in automotive merchandising development.

Henry T. Ewald made the statement. In a recent interview with *Advertising Age*, he says that the product comes first and that, next in importance is sales management and distribution.

"One of the things advertising needs," he said, "is a realization of the fact that the interests of business come first." Continuing, he added:

"There is no solid merchandising success that is just an advertising success — advertising is simply a tool which business uses to achieve its objectives. I prefer to regard myself as a business man specializing in advertising rather than as just an advertising man."

Advertising men may be particularly in need of this kind of reminder; to a greater extent than other departments, perhaps, they too often have seen their copy, their technique and their aims as ends-in-themselves. Not a single department, however, nor a single executive is guiltless of this same fault.

To see *always* each problem as a problem of the business itself —from the point of view of the business as a whole—is difficult for the production man, the engineer, and even for the general executive whose job is to do just that. The degree to which a group of men is successful in thinking constantly in terms of the business as a whole is usually a measure of the success of the given business.

* * *

Road Tests of Streamlining

THE more widely streamlining becomes applied to the modern motor car the more diversified apparently become individual concepts of what ought to be the ultimate streamlined form for ground vehicles.

That the experts disagree was eloquently evidenced by more than one argument at the S.A.E. Summer Meeting in Saranac last week. Most of the practical car engineers are agreed that close correlation between wind tunnel tests and actual road performance is difficult—if not impossible at present. That would seem to be one reason for current differences of opinion, since widespread service tests on a variety of radically streamlined automobiles are not yet available. —N. G. S.

Giving Our Production Tool F

FLEXIBILITY of operation unquestionably is uppermost in the thinking of factory executives today. Production equipment policies and ideas for plant utilization are in a state of flux, ever ready to veer with the trade winds. And well they may be, considering the pressure of frequent model and style changes, hurried shifts in volume and the troubling cost situation.

Under the circumstances it is only natural to find a definite trend to production equipment of the more universal as well as unit type which is capable of ready conformity to fluctuating economic forces. The shuffling of the cards has placed the special or single purpose machine, where it is adaptable, on a sounder basis than ever before. It has and probably always will have an important place in the automotive production picture, but from now on its acceptance will come along very definite economic lines.

In visiting many of the leading plants of the industry we find a vast latent demand for up-to-date manufacturing equipment and materials handling devices of every description. Here and there are seen new operations which require planning from the ground up. But, in the main, the extent of the latent demand is being disclosed as factory executives reexamine their facilities in the light of the new competitive conditions. In the past there has been much loose thinking about the age of existing equipment. Years of use and appearance are no criteria. The thing that counts is the ability to meet the demand for productivity, quality and, above all, competitive costs. These considerations will assume unprecedented importance when the 1935 designs are dropped in the lap of factory executives during the course of the next few weeks.

It is no secret that many plants in the industry have been forced to operate with the same manufacturing equipment for many years. Some have had to be content simply with new tooling programs for the last five years or more. And we can realize, with the great progress that has been made in machine design during that period, how much ingenuity and energy it has taken to keep in step with the procession. In most cases these grave compromises have not been of the production department's choosing. Rather, they were due to the pressure of business conditions and the general clamping down on funds for capital expenditures, forcing many organizations to produce new lines on old, out-of-date equipment, tooled up just to get by. We look for startling improvements all along the line.

One great company in the industry is making a turning point in its career through a complete overhauling of its plant. Before the year is out this company will probably spend around $1,000,000 for new equipment, materials handling devices and a complete realignment of the factory.

When we talk about improving production facilities, the installation of modern equipment, the judicious use of paint, etc., some practical men will pooh-pooh the importance of the psychological effects in the background. That is to say, the inclination is to stick too closely in estimating the value of changes to facts and figures without regard to what might be termed the intangibles. The company mentioned above has had this brought home in unmistakable fashion. Here, for some years, a final assembly line has been tucked away in a corner of the building. It did the job, apparently, and there seemed to be no reason for making a change even though the line may not have compared favorably in many particulars with those in other plants.

Recently the entire line was relocated, completely mechanized, and placed in a new setting of fresh paint. It is interesting to record the effect of this change. The men on the line are imbued with a new morale. They are proud to work in the new setting and show it by increased productivity per man and a better grade of workmanship, all of which is reflected in lower costs for inspection and repairs.

Without attempting to write another law, it is safe to say as a general proposition that normal replacement of equipment in any manufacturing plant will be made only when the organization loses money by operating the old equipment. Any progressive organization that figures its costs accurately will sit up and take notice when new equipment comes along that makes possible a time saving or a labor saving, greater productivity, if that is needed, and better quality.

Here is a case in point. We visited a large volume car builder who strives constantly to keep production facilities right up to scratch. We were shown two operations on the piston machining line which had just been completely retooled to make way for several new pieces of equipment placed on the market during the course of the last few weeks. These machines were adopted because the equipment builder was able to show

Facilities the "Once Over"

A survey of the plants in the light of new competition conditions discloses an unprecedented latent demand for all kinds of equipment to maintain quality and quantity and to reduce costs

by Joseph Geschelin

Engineering Editor,
Automotive Industries

a definite saving on each operation.

Of course the production equipment problem of many parts makers is not so clean cut. For example, one outstanding axle builder is forced to produce perhaps 1200 different kinds of axles. A large steering gear manufacturer has at least 80 different housings in his current line. So, despite the dollar volume of business, these organizations are in reality jobbing shops and can operate economically only through the use of flexible, universal equipment, susceptible to quick and inexpensive changes in set-up. In such plants improvement in production facilities requires a strong economic basis indeed. Unquestionably this basis can be found in many cases and the economic results can well justify the investment involved.

Perhaps the most thought-provoking observation that we have run into recently is that certain important operations have become routinized—static. This seems to apply rather aptly to an operation such as cylinder block machining. The various steps are more or less conventional if not standardized, and differences in equipment are largely due to differences in output. This might apply also to heat treating or the cleaning of bodies preparatory to finishing operations. Here we have a great opportunity for machine designers — an opportunity to make these and other vital operations dynamic once more. For experience shows that improvement in quality and cost reduction is a product of constant change.

Surface broaching provides an illustration of this fact. For years and years the milling machine has held undisputed sway in machine shops as an efficient device for removing metal. Now we are at the beginning of a great development in which an entirely new process, simple, extremely rapid and most economical under certain conditions, has begun to supplant certain heretofore standardized operations. It is encroaching on the former field of the milling machine, gear rougher, grinder and similar machines. And before long we may see the surface broaching machine as a serious competitor to the hugh drum-type milling machines which have been used for finishing the flat surfaces of cylinder blocks, crankcases and cylinder heads.

Greater Swing to Unit Type Machines

How many milling machine manufacturers have recognized this situation and are cooperating with the automotive production man in its development?

As mentioned earlier, there is a greater swing to the universal or unit type of production machine for operations such as drilling, boring, tapping, etc. Some time ago when the trend was in a different direction because of the more stabilized nature of business, one of the large passenger car manufacturers equipped an entire cylinder line with specialized machinery. When this particular engine was discontinued none of the single-purpose equipment could be adapted to a new line. This manufacturer told us it is hardly likely that this would happen again in their organization.

There is always room for single-purpose equipment in the automotive field, but from a sound economic viewpoint the sphere of such equipment lies chiefly in applications involving great volume or the necessity of a special process or a combination of the two. The machinery builder who designs his machine so that a major part of it may be salvaged for the production of similar parts certainly will have the edge on his competitors and will be doing a more constructive job for the automotive industry.

One of the very latest developments to prove itself in the field of metal cutting is the machining of steel parts with special grades of the cemented carbides. We were shown some rather startling figures on an experimental run which had just been completed in one of the large car plants. This particular job was the turning of a tough alloy steel yoke. A cemented carbide tool did the job ever so much faster and cleaner than had ever been possible with a high-speed-steel tool. In fact, the only limitatiton to the speed on this job, within the capabilities of the cutting tool, was the machine. This indicates that the introduction of such cutting materials may cause another upheaval in machine design and will certainly make uneconomical the use of some of the turning equipment that has been doing yeoman duty for these many years.

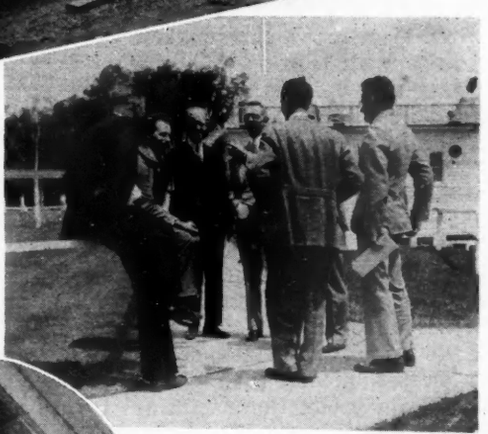
For some time the production equipment situation has been rapidly approaching a healthy condition. In the period when buying was either slow or non-existent, the fac-

(*Turn to page 814, please*)

Fun and Frolic at the S

The match box race—a field-day event

Some of the vehicles supplied as demonstrators by various manufacturers



Messrs. Bridgeman, Cummings, Foster, Geniesse and Reed are in this group

Messrs. Laub, Swayne, Herreshoff and Breese

Looking up at Fred Horner

Part of the water carnival crowd

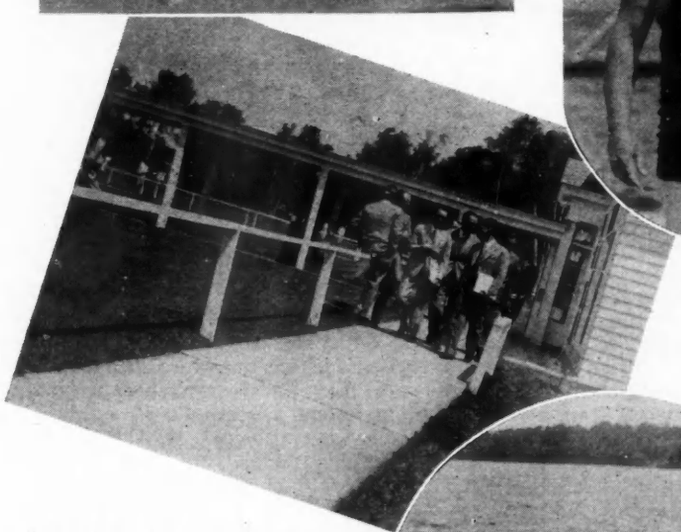
Messrs. Whitney, Bartholomew and Ferguson practice putting

e S.A.E. Summer Meeting

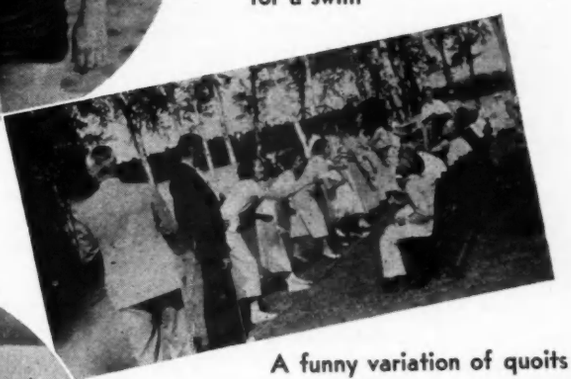
Left—J. J. Cooper, G. D. Welte, B. F. Hopkins and Frank Jardine

Returning from the field-day sports

William Fairhurst ready for a swim



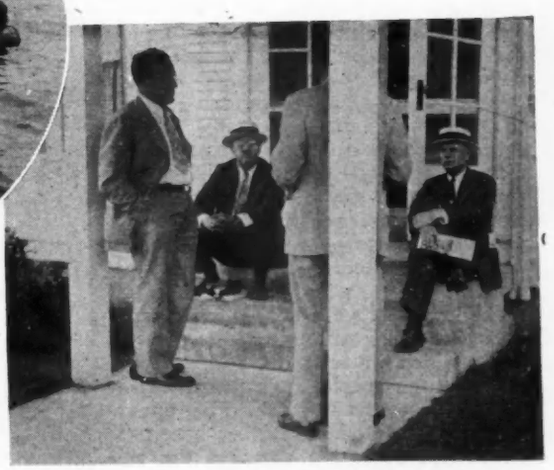
School's out—members returning from a technical session



A funny variation of quoits

Needle-threading contest in the water carnival

Mrs. Hayward, daughter of Col. Alden, Ray Buckendale and the Colonel



Ralph Teetor, Harry Horning and T. A. Boyd

Roll Feeds for Punch Presses

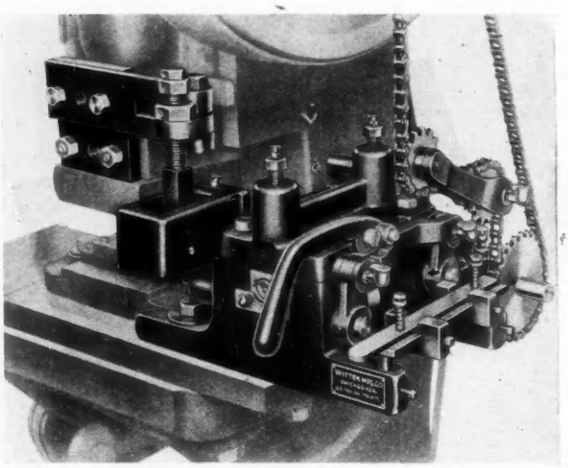


Fig. 1—Close-up of right hand single roll feed, Series N

A COMPLETE line of automatic roll feeds for punch presses has been placed on the market by the Wittek Manufacturing Co., Chicago, Ill. The line comprises the following attachments: single roll feeds, right or left; double roll feeds, reversible; compound roll feeds with straightener; and special roll feeds.

The distinguishing feature of Wittek Feeds is improved and simplified method of operation which is said to produce rapid, accurate feeding under all conditions. The rolls turn constantly, but the forward movement of the stock is arrested momentarily by release of the rolls at predetermined intervals, during the uninterrupted rotation of the rolls to allow for the stamping operation and ejecting of the stamped part. This principle is covered by patents in the United States and foreign countries.

Power for driving the feed is transmitted by chain from a sprocket mounted on the crank shaft of the press to a sprocket on the drive shaft of the feed. An adjustable chain tightener takes up the slack and permits the use of interchangeable sprockets for any desired ratio between the press and the feed. (A variable speed transmission with infinite ratio may be furnished as extra equipment.)

The lower rolls of the feed are driven through bevel gears by the feed drive shaft, which in turn drive the upper rolls through special spur gears which remain in constant mesh. The upper rolls are mounted in floating bearings which rest upon the cams of the release shaft. The upper rolls are held in frictional contact with the stock, while feeding, by means of an adjustable tension spring.

Close-up of the right hand single roll feed, Series N, is shown in Fig. 1. This attachment can be installed on any type of punch press by mounting on the bolster plate. It can feed stock from coils in lengths varying from 0 to 24 in. or more at each stroke of the press. Series N feeds are adaptable for handling stock not requiring straightening and where the weight of the coil is within the pulling range of a single pair of rolls.

Fig. 2 shows the Series L, compound roll feed with straightener designed for feeding light stock from coils, also heavy stock which requires straightening. Standard models are available for handling stock, 4, 6 and 8 in. wide respectively. They will feed from 0 to 24 in. or more per stroke of the press. This combination feed and straightener has seven rolls, two pairs of which are driven feed rolls, while the other three rolls are located between the two pairs of rolls in such a manner that the combined unit serves the double purpose of a feed and straightener. The top idler roll is controlled by a hand release lever, by which the straightener may be thrown into or out of engagement as desired.

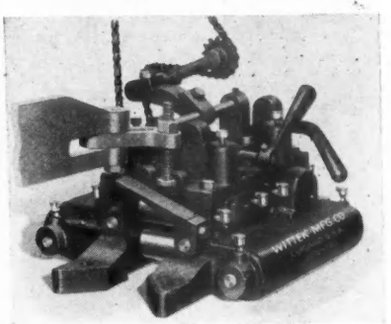


Fig. 2—Series L compound roll feed with straightener for light stock from coils and heavy stock which requires straightening

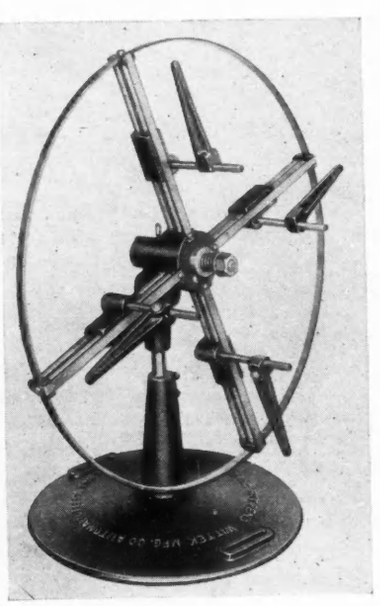


Fig. 3—Wittek automatic reel stand with automatically expanding coil holders

The line also includes the Series D, reversible double roll feeds designed for operations where it is desirable to use a push and pull feed on opposite sides of the punch press for properly feeding the stock. They are efficient in feeding stock which is difficult to handle, such as paper, fabric, foil or other flexible stock, which cannot be pushed through the die. Delicate strips of material can be "floated" through the die in this manner. This double roll feed also makes it possible to feed stock in cut lengths where one strip follows another. The pull feed draws out the scrap, while the push feed starts through the new length.

To round out the line, the company offers three types of reel stands: the automatic which is illustrated in Fig. 3; a manual type similar to the automatic but without the automatically expanding feature; and the disk type designed for holding coils with small cores or with wood centers. The automatic reel has automatically expanding coil holders which move inward or outward along the arms by means of a worm and gear mechanism. Coil holders are always equidistant from center and lock in any position.

Here they come off the final inspection station on the Graham line, ready for the road test

PRODUCTION LINES

Proved It

Many practically-minded people are inclined to pooh-pooh purely psychological effects said to accrue from this or that improvement. Perhaps we can illustrate what we mean by citing the case of modernizing plant facilities through new items of equipment, good painting, conveyorizing, etc. Some will say, and have said, nerts. If the old stuff does the job, we can't afford to change. Well, several days ago we visited one of the famous names in the industry now in the throes of a complete housecleaning. And what a wonderful job they are doing. In one place alone—the final assembly line—they put in a new conveyor, located the line in a different place, cleaned the place and used paint generously, and put in some new items of equipment. Did it make a difference? They tell us that the assembly crew is so proud of the new line, particularly because it compares so well with the best in Detroit, that they are turning out a better job and doing more per man. So much for just an academic idea.

2½ Million a Day

Two and one-half million precision parts a day held to one thousandth of an inch is daily routine at Bantam Ball Bearing plant where quill rollers for the automotive industry are produced. The 1934 lineup of passenger cars showed only two makes not employing this roller bearing. Eighty per cent of all truck manufacturers, it is claimed, will incorporate them in one or more places this year. An interesting application of Bantam quill rollers is in the Diesel engine wristpins of the Burlington Zephyr and the streamlined Union Pacific train. Precision requirements of the rollers at this high rate of production and low cost were met by the development of many ingenious machines and production methods.

World's Fair

Ford's World's Fair building houses an unique exhibit in the form of an electric melting and refining furnace, in actual operation. And this is said to be the first time that the general public has been privileged to see it. The furnace is the well-known Lectromelt. It is a 3-phase machine rated at 500 lb. capacity per charge.

Unusual Irons

R. G. McElwee of the D. J. Ryan Foundry presented a very interesting lecture in connection with a foundry short course early this year. The lecture dwelt particularly on the practicability of making up short runs of unusual cast iron alloys. Modifications possible with special heat treatments, use of alloying elements, etc., were briefly covered. An entirely new vista has been opened by the introduction of the electric furnace and the advance of metallurgical knowledge. Incidentally, Mr. McElwee's foundry is a specialist in short runs of special alloys, and proud of it.

Soldering Aluminum

Soldering aluminum with an ordinary soldering iron at low temperature is reported to have been solved by a Swedish inventor, according to advices to the Commerce Department. The process, it is pointed out, can also be applied to rustless steel. The method employs a special paste and soldering can be done with an ordinary soldering iron. The invention has been tested at the Physics Institute of the University of Stockholm and pronounced practical.

Sample Book

Synthane Corp. of Oaks, Pa., has just developed a handy pocket size sample book illustrating its line of laminated Bakelite sheets, rods, tubes, fabricated parts, etc. Distinctive feature of the book is the presentation of actual samples of material slipped into paper envelopes. Complete technical details, specifications and production data also are given. Glad to get you a copy if you're interested.

Bakelite Synthetic

For a quick-reading background on synthetic resins for paints and varnishes we recommend the little 24-page booklet issued by Bakelite. Development and applications are covered in an informal fashion.

High Strength

Understand that International Harvester has just installed a Lectromelt furnace for making special high strength gray iron and steel products at their tractor works. This furnace has a capacity of 1000 pounds per heat.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

Copper-Lead Engine Bearings

"COPPER-LEAD bearings are coming into use fast, because actual service has indicated longer bearing life and elimination of cracked bearings as engine mileage piles up," said C. M. Larson, supervising engineer, Sinclair Refining Co., in his S.A.E. Summer Meeting paper on "Lubrication of Engines with Different Bearing Metals, with Special Reference to Copper-Lead Alloys."

Mr. Larson made a series of tests to determine the ultimate temperatures with different specific loads and different lubricants. These tests were made with babbitt-lined bearings. With 10W oil the following results were obtained:

Specific Load	Oil Viscosity	Oil Temperature
0	470 sec.	56 deg.
250	320 sec.	64 deg.
500	225 sec.	74 deg.
750	89 sec.	110 deg.
800+	80 sec.	115 deg.

Oils 20W and SAE 30 showed about the same trend, but for the same viscosity SAE 30 carried a greater load per sq. in. than 20W, which latter under the same conditions carried a greater load than 10W. SAE 30 oil carried loads up to 2400 lb. per sq. in.; 20W, up to 1350 lb. With all oils held at 100 sec. viscosity, 10W carried a limiting load of 780 lb. per sq. in.; 20W 1230 lb., SAE 30, 2250 lb. and SAE 40, 2650 lb. By adding a fixed oil compound the viscosity index of 10W oil can be reduced and its load-carrying capacity greatly increased.

Comparative tests were made on babbitt and copper-lead bushings, the tests bearing on the stable running temperature and the operating viscosity as related to the specific load. SAE 30 and 10W oils were used. For any given specific load the stable running temperature generally was lower for the babbitt bearing, and the operating viscosity was higher. The value of the friction coefficient for any given value of the expression ZN/P (viscosity × velocity/specific pressure) was lower for the copper-lead bearing.

Tests were also made to study the effect of the addition of 2 per cent of various fatty oils to SAE 30 oil, on the minimum friction coefficient with 500 lb. beam load. In every case the minimum friction coefficient was much lower with copper-lead than with babbitt bearings, but certain fatty oils raised the coefficient of friction over that of a straight mineral oil. Copper, nickel and antimony act as catalysts and accelerate the decomposition of certain fatty oils.

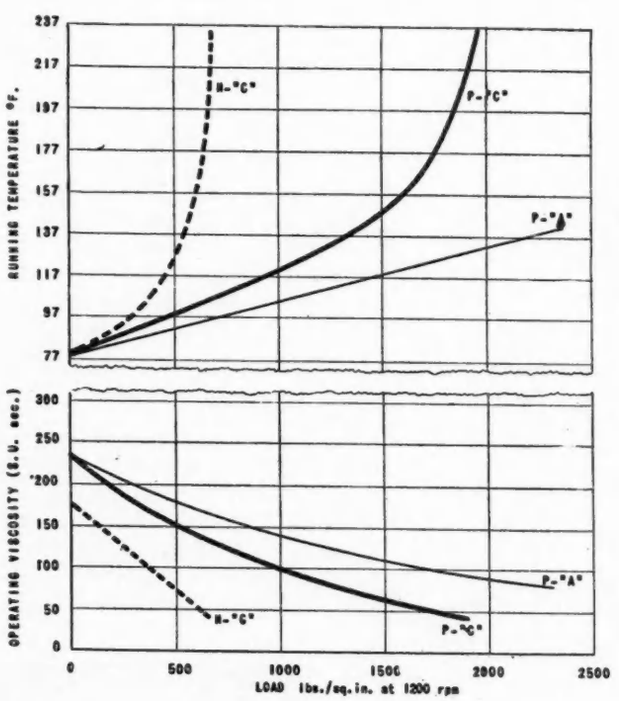
Used engine oils attack the lead in copper-lead bearings. To study this effect, SAE 30 oil was sludged at 280 deg. F. for 125 hours and copper-lead bearings of three different compositions were kept hot in this sludged oil for 120 hours, one set at 210 deg., another at 320 deg. The amount of lead found in the oil at the end of the run varied from 0.09 to 0.22 per cent. When the lead-copper-nickel bearings were examined after this treatment, their dark appearance indicated that lead had been dissolved from the surface and the copper exposed. Tests of these bearings in the friction machine with new oil indicated that their bearing properties were not impaired by this slight loss of lead, equivalent to a layer of 0.0001 to 0.00025 in., but rapid sludging of some of the oils under summer driving conditions would be detrimental to the process of lubrication.

It is well known that an addition of 1 per cent of carbon tetrachlorid to mineral oil will increase the load capacity of a steel-to-steel bearing, but when such a compounded oil is used in a copper-lead-bearing, failure will occur at a much lower load or temperature than in the case of lubrication with straight mineral oil. A marked improvement is effected by reducing the tetrachlorid content to 0.04 per cent. Sulphur chloride, as used for extreme-pressure transmission lubricants, gives good results when limited to 0.005 per cent. In developing extreme-pressure engine and break-in oils, special precautions must be taken if copper-lead bearings are employed.

* * *

IN discussing S. W. Sparrow's Summer Meeting paper (*Automotive Industries*, June 23, page 772) on copper-lead bearings, Robert G. N. Evans, research engineer of the Bunting Brass & Bronze Co., said that with a view to increasing the hardness of babbitt and delaying its softening on increase in temperature, various elements had been added, and as a consequence the hardness at room temperature had been raised to 20-25 Brinell, but at the approximate operating temperature of 300 deg. F. it was still only 6-12 Brinell. A higher copper content would increase the endurance, but the material would still be inadequate for modern conditions.

The speaker said his experience agreed with that of Mr. Sparrow with



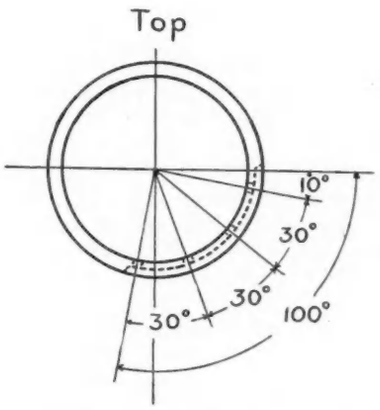
Stable operating temperature, and viscosities for 10-W oils at various loads with bearing metals A and C

P = 10-W oil
N = 10-W oil
A = S.A.E. No. 11 babbitt
C = copper-lead (Cu., 67; Su, 2; Pb, 30; Ni., 1)

gs Are Coming Fast, Larson Says

respect to crushing of the lining material along the parting lines of the bearing. One of the sources of weakness of babbitt is its low heat conductivity. The heat generated therefore remains at the rubbing surface and lowers the oil viscosity. Plastic (lead) bronze has a high heat conductivity, and in a comparative test on babbitt and plastic bronze bearings under open throttle at 3800 r.p.m. for a period of 105 hours, thermocouples sunk in the bearing metal close to the rubbing surface showed a difference of 32 deg. F. in favor of the bronze.

Within limits, larger bearing diameters and shorter bearing lengths tend to maintain the oil film and stave off failure. Reduction of the length/diameter ratio reduces flexing of the lining near the ends of the bearing and wedging of the oil film in the direction parallel to the axis.



Arrangement of oil groove and oil holes suggested by Mr. Evans

Mr. Evans expressed the view that copper-lead alloy would become the common bearing metal. Its advantages are due to its higher melting point, lower coefficient of friction at high temperatures and greater resistance to deformation. Bearing life is a function of bearing-metal characteristics, shaft finish, shaft hardness, and oil film. In a comparative test on a mile dirt track, babbitt-lined connecting-rod bearings failed after 1300 miles. Replacing them with plastic bronze bearings, leaving the crankpins as they were, but cutting down the oil inlet and increasing the running clearance, no failure occurred up to 76,000 miles, when track conditions stopped the test.

"Washing away" of the lead in bronze-lead bearings occurs when there are fatty acids in the lubricant, Mr. Evans said, but in his firm's alloy this was minimized by the presence of an additional element. He thought a protest was in order with regard to the use of compounded so-called break-in oils that would injure the bearing surfaces. The combined area of all oil outlets should be less than that of the oil header, so that a pressure can build up in the header and a little extra running clearance in one bearing will not starve the others. Drawing herewith shows a plan of increasing oil supply to the crank-pin. A circular groove ⅛ in. wide and 0.020-0.025 in. deep is cut in the outside of the bearing shell extending over 100 deg. of arc in a plane perpendicular to the axis. Four ⅛-in. holes are drilled at the bottom of the groove. Thus the oil hole in the crankshaft registers not only once but several times during each revolution. The groove can be carried all around the bearing.

When there is dirt in the oil entering the lubrication system the bearings will be scratched at the point of entry. Oil filters help if the filtering element is kept clean, and they have the further advantage that they reduce the temperature of the oil.

J. B. Fisher of the Waukesha Motor Co. said there was quite a temptation to add tin to copper-lead alloys, as it promotes uniform distribution of the lead, but it has the disadvantage that it hardens the alloy. In his opinion the Brinell number should be kept as low as possible and still have the fine grain that is the success of the copper-lead bearing. He favored supplying oil to both the upper and lower halves of the bearing, as this made for more quiet operation, and said the oil groove suggested by Mr. Evans should preferably extend all around the bearing.

Dr. Dickinson mentioned that in view of the fact that heat conductivity was an important characteristic of bearing metals, if manufacturers of such metals should want the heat conductivity thereof determined, they could have it done at the Bureau of Standards, which had equipment available for the purpose.

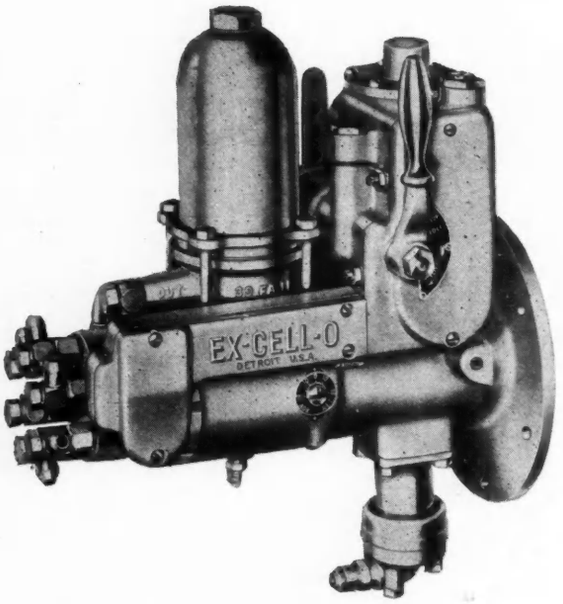
C. M. Larson who read a paper at the Bearings and Lubrication Session of the S.A.E. Summer Meeting

J. J. McIntyre of the Cleveland Graphite Bronze Co. said that if copper-lead bearings were to be used and operated at considerably higher temperature, the oil consumption would inevitably increase, since the chemical stability of all petroleum products decreases rather rapidly above 250 deg. F.

Ralph Teetor said piston ring manufacturers were not all satisfied with the oil mileage of the average cars now on the road, which was only about 25 per cent what it should be. The consumption should not exceed one gallon per 2500 miles at 55 m.p.h., whereas the tests of the Standard Oil Co. of Indiana at the Indianapolis Speedway had shown a consumption of one gallon per 650 miles under these conditions.

At the conclusion of the session the formation of a sub-committee of the Lubricants Division, made up of representatives of the automobile, petroleum and bearing industries, to study problems of lubrication with copper-lead bearings, was suggested, and the proposal was favorably received.

DEMONSTRATION by W. S. James of a new EP lubricants testing machine, developed primarily by the Studebaker Corp., was another high point of the lubrication session. The new machine, simpler and less costly than the Bureau of Standards type, was offered as a possible alternative to the Bureau's machine as a potential standard for the industry. The question of standardization was left open, however, in the report of EP Lubricants Committee.



Ex-Cell-O injection pump and filter. Note mounting flange by which the unit is mounted to the back of the timing gear housing

Ex-Cell-O I
Filter in N

by P. M. Heldt
Engineering Editor,
Automotive Industries

A STOCK fuel-injection pump for Diesel engines is now being offered builders of such engines by Ex-Cell-O Aircraft & Tool Corporation, Detroit, Mich. The pump, which is claimed to be the first of its kind to have been conceived, designed and produced in this country, was exhibited at the S. A. E. Summer Meeting at Saranac Lake and at the National Oil and Gas Power Meeting of the A. S. M. E. at State College, Pa., during the week of June 18.

Ex-Cell-O Aircraft & Tool Corporation is particularly well equipped to manufacture such a device, as for many years it built precision parts of fuel-injection systems for engine manufacturers. It is well known that greater precision is required in the manufacture of fuel-injection pumps than in that of almost any other piece of mechanism that is produced on a quantity basis and placed in the hands of the general public.

The problem which the designers set themselves was to incorporate all of the precision parts of the pump in one unit assembly which could be sealed at the factory, on which no adjustments would have to be made when first assembled, so none could slip or be tampered with in service. This unit must comprise all of the hydraulic parts of the pump. The exchanging operation must be so simple that it could be made by anyone capable of making ordinary engine repairs, even though he had no special knowledge of Diesel engines or injection pumps.

To meet these requirements, all of the pump-plunger bores are machined in a single block, and quantity control for all pump cylinders is by a single part which affects all pump cylinders alike. The first feature was adopted with a view to preventing cumulative errors affecting quantity control.

The plunger bores, whose axes are parallel, are arranged in a circle concentric with the pump drive shaft. From each plunger bore a radial by-pass hole leads inward and opens into a central low-pressure fuel-supply belt. This is formed by a recess which completely surrounds the central rotary valve except for one triangular-shaped land which is a close lapped fit in the rotor bore; the fit of the ends of the rotor, which define the recess, is of the same character.

The central valve is rotated by the pump drive shaft, which also imparts reciprocating motion to the pump plungers, by means of a simple swashplate acting through tappets which take the side-thrust components of the drive.

As the radial by-pass holes are equal in diameter and located at right angles to the rotor bore, when the rotor is in motion, the land on it closes the various by-pass holes in succession, each during a period in terms of degrees of pump-shaft rotation which depends on the relation between the diameter of the hole and the width of the land. By moving the rotor in the direction of its axis, any desired duration of injection up to the maximum can be obtained. Since the central rotary valve is in motion continuously, its axial displacement requires very little force, hence a light governor will control the pump satisfactorily.

The design just referred to makes it possible to seal all of the fuel-handling parts of the pump in a unit which is interchangeable with other, similar units, and since these sealed hydraulic units are so designed that incorrect attachment to the driving unit (which contains the mechanical parts of the pump) is impossible, this operation can be performed by anyone who could properly exchange, say, two identical cooling-water pumps.

As the land on the rotary valve is timed to mask the by-pass holes when the pump plunger is near its maximum velocity, by advancing or retarding the rotary valve with relation to the plunger reciprocation (which always remains fixed with relation to the engine timing), control of the injection timing may be effected by producing only the slight torque necessary to overcome the resistance of the rotary valve. The timing-control mechanism therefore can be very light and requires very little power to operate it. Timing of the fuel injection can be made responsive to engine speed, if desired, through the medium of a light governor element separate from the engine-speed governor.

All mechanical parts of the pump,

Incorporates Governor and New Diesel Injection Pump

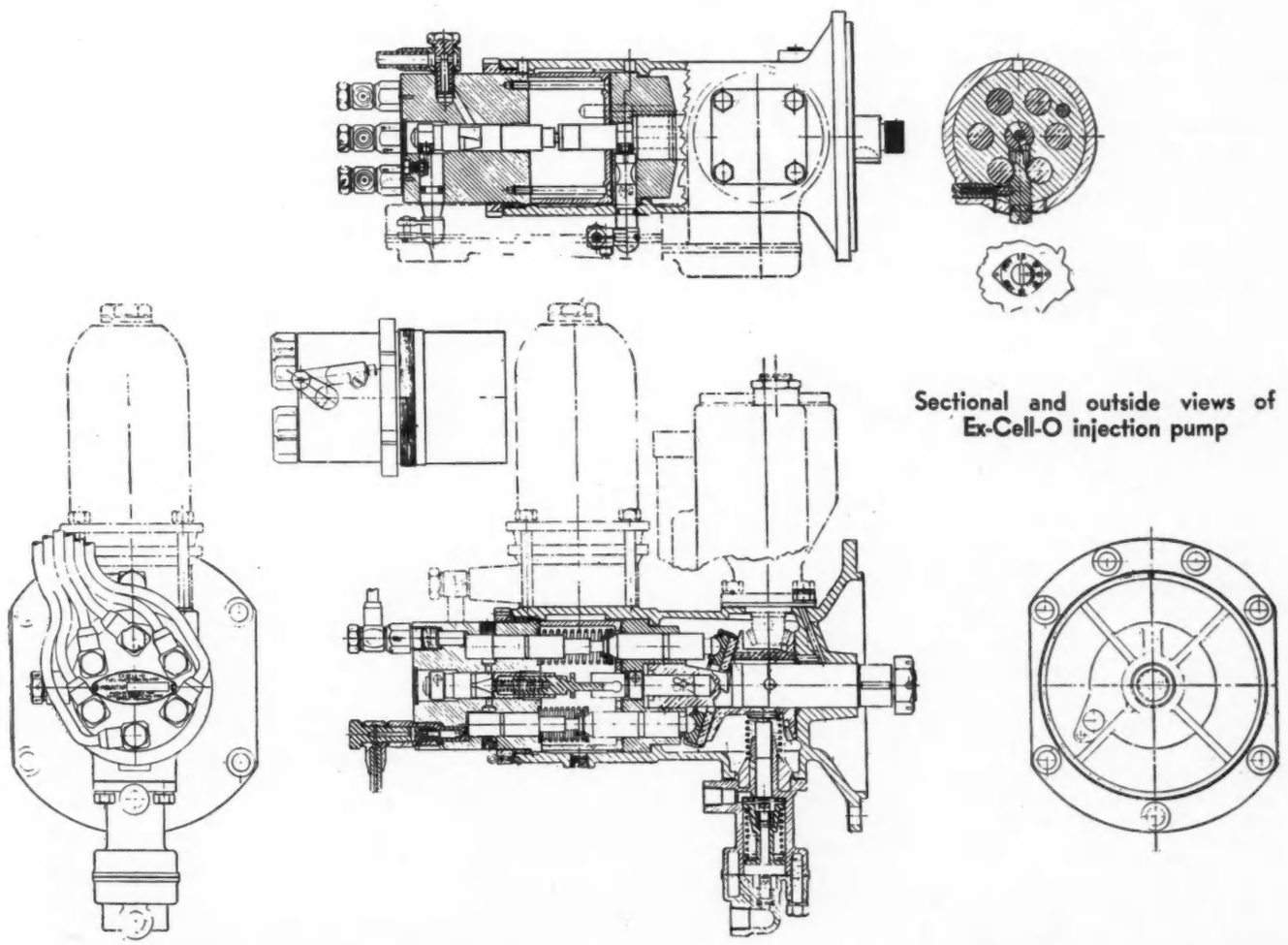
such as the main bearings, the swashplate, the tappets and governor, are pressure-lubricated from the engine lubricating system.

A two-element filter (edge-wound and fabric) of Purolator make is incorporated in and made a part of the pump structure. This, the manufacturer points out, insures that a correct filter is used and that the filter is properly installed to prevent "air-binding."

When required, a self-controlling fuel-transfer pump is also furnished as part of the equipment. The outstanding points of the transfer pump are that it has a double-acting, spring-pressed plunger which delivers fuel in both directions of its reciprocating travel; and that it has very small clearance volume, which makes it an excellent "air pump," enabling it to quickly lift fuel against disadvantageous suction heads, even though the suction line may have become filled with air.

The speed-control governor is adapted to be fitted with various types of springs and controls, to enable it to be used for constant speed, adjustable speed, or variable speed with either local or remote control, so that all requirements of automotive, marine and industrial applications may be met.

One of the distinctive features of the Ex-Cell-O pump is the method of flange-mounting on the engine, whereby the pump becomes practically a part of the engine structure. This greatly simplifies installation by the engine builder. Flange mounting also prevents misalignment, which latter is said to cause rapid wear of couplings and pumps.



Sectional and outside views of Ex-Cell-O injection pump

Engineers Argue Streamlining at S.A.E. Summer Convention

by A. F. Denham
Detroit Editor, Automotive Industries

IS THERE a fundamental form for a "correctly streamlined" automobile? That in a nutshell was one of the most widely discussed topics at the Summer Meeting of the Society of Automotive Engineers. However, the question was not answered to the satisfaction of the majority of engineers present.

It was emphasized that too little is known today about the effect of various theoretical streamline forms to permit a rational analysis. Repeatedly it was brought out—as *Automotive Industries* has pointed out in the past—that an automobile differs from a vehicle traveling through air or water in that it does not always travel directly forward in the medium for which it is to be "streamlined."

In water and in the air the vehicle is free to move with the medium if that is in motion, in addition to moving under the influence of its own means of propulsion. That is not true of the automobile. As a matter of fact, it was seriously questioned whether or not an automobile streamlined for fore-and-aft movement to reduce power consumption would be safe to operate in side or quartering winds. Lowell Brown and Herbert Chase of the Jaray Streamline Corp. stated that the most desirable form for a streamline vehicle was one-half of a streamlined body of revolution (commonly referred to as a tear drop). William B. Stout said that this form in effect was that of a wing curve, and if it were used in plan form, under the influence of a quartering wind, the vehicle would have several times the tendency of a flat-sided car to go into the ditch, due to the lift produced by the creation of a vacuum on the far side

Wind Tunnel Tests Questioned

What was needed here, he said, was to "spill" air into this location to prevent the formation of a vacuum. For this he asked for more sloping body sides, and streamlining of the under side of the automobile to permit the air to flow across from side to side more readily.

Mr. Stout and others were frank in stating they did not believe that wind-tunnel tests on car models were worth anything in the determination of full size cars in actual operation, primarily because road operating conditions cannot be duplicated in wind-tunnels.

In the discussion of the safety and controllability of streamlined automobiles, Louis Schwitzer cited experience at Indianapolis, where it was found that the directional stability of certain race cars was very bad, the drivers having no steering control at all at the higher speeds, and that control was largely restored by destroying the streamline form of the tail.

Herbert Chase, talking for the Jaray Corp., admitted that the full streamline form would produce an unstable vehicle, but he claimed that the recommendation of the Jaray company solved this problem.

Then there is the question of "eye-appeal." It has been repeatedly stated that if an automobile were correctly "streamlined" it would of necessity be beautiful. E. P. Warner was among those who questioned that belief; so were Walter Fishleigh and others.

"Perhaps streamlining and style are synonymous," Mr. Warner said, "and perhaps they are not. You can't measure eye appeal."

Mr. Warner also seriously questioned the rationality of the application of pure aerodynamics to the complete automobile. He added that streamlining from an aerodynamic standpoint would be useful only if it brought about acceptable eye-appeal, in addition to reducing noise, etc. In this latter connection he questioned how much of so-called "wind noise" was attributable to air eddies, and how much to induced vibration of car parts, such as panels, and he recommended that this subject be more widely investigated.

That brought up the subject of the texture of materials. An experiment by Pittsburgh Plate Glass Co. was cited. A plate of smooth glass was found to collect more dust than a plate of ground glass when exposed on a roof, from which the conclusion was drawn by some that the smooth surface (in this case at least) was little better in reducing wind resistance than the rougher type. Whether materials of softer texture would decrease noise by reducing drumming tendencies was another question raised. Mr. Stout pointed out that for an underpan a flexible material was desirable, as it would eliminate or reduce impact noise from gravel and stones, as well as reduce drumming.

Other experiments with streamlined cars were cited, some dating back to 1904. Some were claimed to have produced phenomenal results in view of the small horsepower of the vehicles, while others were not so satisfactory or seemed to affect safety adversely.

Engineers Are Interested

It was evident that engineers are deeply interested in this subject, but, as Herbert Chase said, "nobody knows anything about it," and before the industry could say whether or not it really wanted true streamlining (if possible) it would have to find out from actual operation of experimental vehicles just what a streamlined automobile should look like.

Mr. Kalb pointed out that cars must be braked and parked, and if they required a long tail, that would be a handicap. If they had to look like a potato bug, commercial considerations would certainly prevent their immediate acceptance.

All in all, making an exception of the material included in the paper by George McCain of the Chrysler Corp., dealing with results achieved with the Chrysler Airflow design, little that was concrete in the way of streamlining data came out of the sessions devoted to this subject.

The streamlining discussion was not confined to automobiles. Streamlining was the major topic also in the discussion on railcars. Here, too, there was considerable difference of opinion as to whether true streamlining was essential. As strong an advocate of "streamlining" as Mr. Stout at this session expressed himself as of the belief that weight reduction was very much more important than streamlining.

New White Chassis
Model No. 712

White Adds Two New Jobs with Weight Distribution of 1/3-2/3

WITH the introduction of two new truck models—712 and 707 The White Company is in the unique position of being the first truck builder in this country to offer a fully rounded line featuring a weight distribution of 1/3-2/3.

The White Model 712 has a gross weight rating of 17,000 lb. and a nominal rating of 2½ to 3½ tons. It is offered at a list price of $2,550 and is furnished in a range of wheelbases running from 130 to 190 in. making possible the use of bodies as long as 15 ft.

Model 707 is introduced to meet the need for a chassis having a large carrying capacity with a small economical engine which seems to be desirable for light tractor-semi-trailer and six-wheeler equipment operating on long distance hauls. It has a G. V. W. rating of 15,000 lb. and is listed at $1,790.

Both new models as well as the other models in current production are equipped with a newly designed cab which is wider, more roomy, and greatly improved in appearance. The directional ventilation system used on former models is incorporated in this design, adding to driver comfort. As in the original "K" series, weight redistribution is accomplished by moving the cab forward so that the engine projects partly into the cab. The engine shrouding within the cab has been improved and more leg room provided for the driver.

Weight distribution is sensibly 1/3-2/3 although not precisely in that ratio due to a slight increase in cab length. However it approaches ideal distribution conditions and thus permits a more economical use of tire equipment. In fact in some cases smaller tire sizes may be used with a consequent first saving.

The Model 712 has an entirely new engine, 9A, of 3 25/32 in. bore and 4½ in. stroke, 6-cylinder "L" head construction. It has a displacement of 303 cu. in., develops 90 hp. at 2800 r.p.m. and has a torque rating of 204 lb. ft. The engine features a seven bearing, heat treated, counterweighted crankshaft, balanced dynamically and statically. Steel backed bearings are used in both main and connecting rod bearings. Three point suspension with rubber mountings all around has been provided.

Full pressure lubrication and the improved White screwed-in exhaust valve inserts are among the other features. Full flow oil filter and a vacuum type governor are standard equipment.

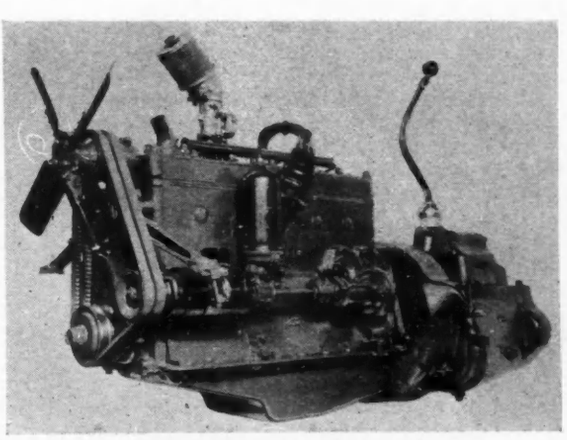
An all-metal helical gear train is used at the front end. The generator is belt-driven by a double belt and in turn drives the water pump which is located accessibly at the rear on the left side. In the interest of accessibility, a downdraft carburetor is used in conjunction with an oil-wetted air cleaner.

The Model 712 is equipped with a single plate wet clutch and the standard White 5-speed transmission with direct on fifth. As an option, at slight extra cost, a new 5-speed transmission can be supplied with direct on fourth. A full-floating, banjo type rear axle is standard. Four wheel hydraulic brakes with a vacuum booster together with a vacuum reservoir are provided.

The Model 707 uses the same engine and transmission as the Model 702 which was announced last year but is heavier all around.

The engine is 6-cylinder, 3 5/16 by 4⅝ having a displacement of 240 in. It develops 68 hp. at 2800 r.p.m. and has a maximum torque rating of 152 lb. ft.

Clutch is single plate dry type; transmission four-speed. The service brakes are four wheel hydraulic with a reaction type booster.



New White 6-cylinder (9A) 90 hp. engine

Nutt Makes Preliminary Report on Knock Tests of Aviation Gasolines

AS recently as January, 1933, there were at least four methods of knock-testing aviation gasolines employed in this country alone. While some fuels gave substantially the same relative values by all four methods, others showed up less favorably when the test was more severe (larger engine cylinders), while still others showed up more favorably under these severer conditions. To reduce the confusion existing in the aviation-fuel field, an aviation gasoline detonation sub-committee was appointed by the Cooperative Fuel Research Committee to try and correlate the results obtained by the A.S.T.M.-C.F.R. motor method with those in actual service in engines, and a preliminary report on the work of this subcommittee was rendered at the Summer Meeting by Arthur Nutt, Wright Aeronautical Corporation. Several engine manufacturers offered to run engine tests and a number of oil refiners offered fuel and funds for the purchase of reference fuels and to finance the cooperation of the Bureau of Standards.

The fuels tested grouped naturally into three general classifications:

A. Fuels giving constant values under a variety of test conditions.
B. Fuels showing depreciating values as test conditions became more severe.
C. Fuels showing appreciating values as test conditions became more severe.

The selected test fuels of the various types were segregated and handled as carefully as the secondary reference fuels with which they were matched. The test fuels ranged from 69½ to 89 octane, the higher knock values being secured by the addition of lead tetraethyl or benzol. The secondary reference fuels consisted of blends of the Standard Oil Development Company's A3 and C7, and C7 plus tetraethyl lead to 73, 80 and 87 octane respectively.

Engines selected and used in the test work included a Lycoming R-680-2, a Pratt & Whitney Hornet S.D., a Wright SV-1570, and a Pratt & Whitney Wasp R-1345.

The procedure prescribed by the committee provided for comparing the three reference fuels with appropriate test fuels until the blend of test fuel of each type matching each reference fuel be determined. The method employed is that of making mixture control runs with the throttle locked at a point just giving satisfactory performance for the fuels compared and matched. The head temperatures, cylinder-base temperatures, power output and specific fuel consumption are all measured at each mixture-control position and the mixture leaned out until the head temperature becomes critical, with an appreciable loss of power.

While results of some of the tests were given, the investigation is only about half completed and no conclusions were drawn from the tests in the paper.

Becker and Fischer Propose New Quality Index for Diesel Fuels

A NEW quality index for Diesel engine fuels, called the Diesel index, was proposed in a paper by A. E. Becker and H. G. M. Fischer of the Standard Oil Development Co.:

$$\text{Diesel Index} = \frac{\text{Aniline Point (Fahr)} \times \text{A.P.I. Gravity}}{100}$$

Experimental data were presented showing that the logarithm of the Diesel index is a linear function of the critical compression ratio of the fuel, which increases as the Diesel index decreases. There is also a fair degree of correlation between the Diesel index and the spontaneous ignition temperature of the fuel, which also increases as the Diesel index decreases. A low critical compression ratio and a low spontaneous ignition temperature (which always go together) are necessary for smooth operation of high-speed Diesel engines, hence the higher the Diesel index the better the fuel.

It was proposed in the paper that the Diesel index be used as a temporary standard for ignition quality of fuel oil. One advantage claimed for it over other proposed indices is that it depends on two easily determined physical constants, of which one, the gravity, is customarily determined for all test samples, while the other, the aniline point, is determined by heating a mixture consisting of equal volumes of aniline and the sample, in a jacketed test tube to a clear solution and then noting the temperature at which turbidity appears on cooling. It was said that further field data are being collected to determine whether the index is suitable for adoption as a permanent standard of Diesel fuel performance. It would have the advantage that engine tests would not be required, or at least could be limited to research and control laboratories.

In the discussion a number of speakers warned against adoption of the method as a standard procedure before it had been thoroughly tried.

Bureau of Standards Reports on Vapor Lock

A FURTHER report on the cooperative investigation on vapor lock was made at the S.A.E. Summer Meeting by Oscar C. Bridgman, J. C. Molitor and F. B. Gary of the Bureau of Standards. Road test data on 18 cars with two widely diverse types of fuel indicated that the effect of fuel characteristics on vapor lock, for a given Reid vapor pressure, can be neglected when considering present-day cars, in view of the wide ranges of vapor-handling capacities and fuel line temperatures. In the case of any individual car, however, marked differences may be found between the vapor pressures of different types of fuels necessary to cause vapor lock under identical operating conditions. These marked differences are found only in cars having such high vapor-handling capacities that they will not vapor-lock on any fuel regardless of type, within the range of commercial vapor pressures.

From the results of the tests an equation was evolved which gives the maximum vapor pressure of the fuel in terms of atmospheric temperature and pressure that will assure reasonable freedom from vapor lock in present-day cars, regardless of type of fuel being used. This equation gives the following values:

Max. Atm. Temp. Deg. F.	Reid Vapor Pressure (lb., sq. in.) Permissible at Sea Level	5000 Ft.	10,000 Ft.
100	8.0	6.8	5.5
85	10.0	8.4	7.0
75	11.6	9.7	8.1

The temperatures given, it is emphasized in the report, are not average values but maximum values beyond which the tabulated vapor pressures must not be used if reasonable freedom from vapor-lock is desired.

Japanese Scientists Develop Simple Optical Indicator

This is the fourth article in a series describing progress in the development of indicators for high speed engines

by P. M. Heldt
Engineering Editor, Automotive Industries

THREE Japanese scientists, Fujio Nakanishi, Masaharu Ito, and Kikuo Katamura, who are connected with the Aeronautical Research Institute of the Imperial University of Tokyo, have developed an optical indicator which is quite simple in construction and whose moving parts have a frequency of vibration of the same general order as that of the latest electrical and piezo-electric indicators.

These investigators reason that there is no need for the complicated electrical equipment used in connection with some recent type indicators, in which the final moving part, which produces the movement on the ground glass screen or photographic plate, has a motion no greater than that of the diaphragm on which the cylinder pressure acts.

Two sectional views of the pressure element of this indicator are shown in Fig. 1. The element comprises a diaphragm of stainless steel which connects by an integral central stud to a beam spring carrying two mirrors. These are spaced some distance apart and their planes make angles of 45 deg. with the plane of the diaphragm. Light admitted to the instrument through a pinhole and condensed by a lens, falls upon one of these mirrors and is reflected by it onto the other, which in turn reflects it and throws it onto a revolving drum carrying a card, the light passing through a condensing lens on the way from the second mirror to the drum. The pinhole fixture, the short-focus lens, and the indicator drum are mounted independent of the engine, hence are not affected by engine vibration.

The two 45-deg. mirrors are mounted on those portions of the spring beam at which the deflection is a maximum. Their angular relation is varied by the gas pressure in the combustion chamber, and the incidence of the beam of light on the drum varies with the gas pressure. Engine vibration does not affect the angle between the mirrors and therefore does not change the indication.

The deflection of the beam for maximum cylinder pressure is only about 0.02 mm. (0.0008 in.), and the natural frequency of the moving system ranges between 7000 and 10,000 cycles per second. All deformations are well within the elastic limit and the instrument therefore has a strictly straight-line characteristic. There is a cock in the body of the diaphragm chamber, by means of which communication with the combustion chamber can be established and interrupted. The diaphragm is only 0.004 in. thick.

Some engine cylinders do not have a second spark-plug hole into which the pressure element can be inserted, and the latter is then combined with a spark-plug having the standard 18-mm. metric thread. This makes the passage to the pressure diaphragm

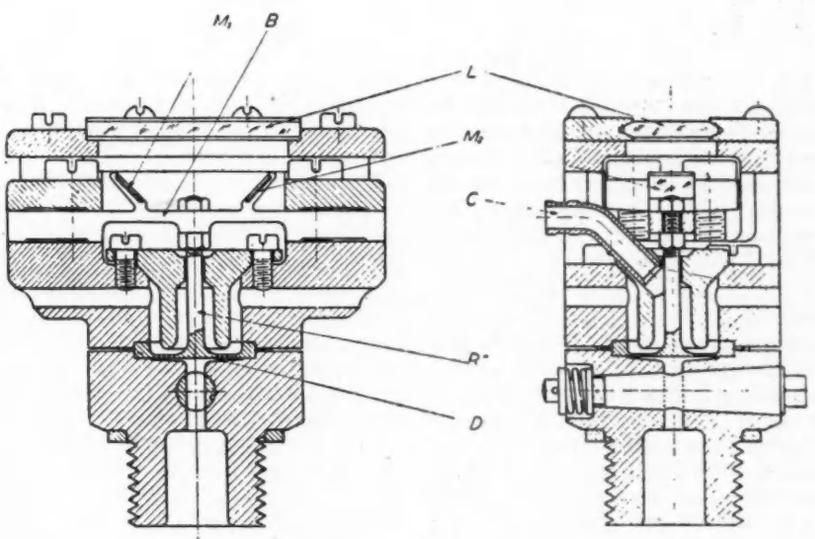


Fig. 1—Two sectional views through the pressure element of the indicator of Nakanishi, Ito and Katamura

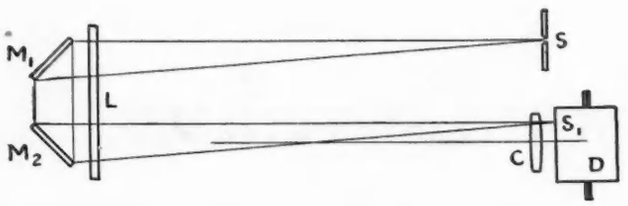


Fig. 2—Diagram of the optical system of the indicator

somewhat longer, but if there is only one spark-plug hole this is the only choice.

The sponsors of this indicator are now making use of a recording camera. This is provided with a shutter through which the beam of light enters the camera. After passing through the shutter the beam passes through a lens to a rotating mirror at the axis of the nearly semi-cylindrical film holder. To indicate the piston position on the card, the beam of light is interrupted at definite intervals.

A diagram of the optical system of the instrument is shown in Fig. 2. In this illustration, S is the pinhole fixture through which the beam of light from the source passes. The beam of light passes through lens L and falls on mirror M_1, which reflects it onto mirror M_2, by which latter it is reflected once more and then passes through lenses L and C and strikes the card on drum D at point S_1.

In the paper describing the instrument (Report No. 87 of the Aeronautical Research Institute, Imperial University of Tokyo), diagrams are reproduced which were taken with this instrument on a motorcycle engine, running under its own power, at 2000 r.p.m., and when motored at 1500 r.p.m. The paper also contains reproductions of diagrams taken on a Benz 160 hp. aircraft engine which show clearly the more rapid pressure rise with dual-spark as compared with single-spark ignition (at 1400 r.p.m.). The expansion lines show slight undulations, which are ascribed to pressure waves in the passage to the diaphragm. The authors prove graphically that any vibration of the pressure element comprising lens L and mirrors M_1 and M_2 does not affect the position of point S_1 on the card.

Design and Calculation of Modern Engines

Entwerfen und Berechnen Neuzeitlicher Nutzkrafwagenmotoren (Design and Calculation of Modern Commercial-Vehicle Engines), by Dipl.-Ing. Karl Schwaiger. Published by M. Krayn Technischer Verlag, Berlin.

This volume carries the sub-title "With Special Consideration of Motor-Vehicle-Type Diesel Engines." It appears that in Germany it has come to be the practice of truck manufacturers to equip their trucks with either a gasoline or a Diesel engine at the option of the customer, and as it would be rather expensive to have a separate engineering department for Diesel engines, the engineering department of a truck and bus manufacturing plant must be familiar with both types. Both are therefore dealt with side by side in the book under review.

The author points out in his preface that during the past decade, the manufacture of commercial vehicles has made great forward strides and has become sharply differentiated from passenger-car design. In this way there arose a need for a handbook for the instruction of the junior members of the engineering staff of bus and truck plants, and the book under review is designed to fill this need. As regards engines, the fundamentals of passenger-car and truck engines are the same, of course, but this hardly invalidates the author's argument, for he does not go deeply into the fundamentals of the internal combustion engine, as may be judged from the fact that the whole subject is covered in 172 pages. The book seems to have been written particularly for those who, already having a general knowledge of internal combustion engines, want to familiarize themselves with the latest practice in the design of these engines for a particular field of application.

The author is works manager of the Daimler-Benz commercial vehicle factory and writes from the standpoint of the practical engineer. He begins with an outline of the legal restrictions on commercial vehicles, particularly in Germany, briefly discusses certain standards insisted upon by large fleet opera-

Giving Our Production Facilities the "Once Over"

(*Continued from page 801*)

tories relied largely upon their source of surplus equipment and drew rather heavily on these stocks both in the form of complete machines and replacement parts. As a result, at the present writing the stocks of machines in storage are down to a rather low figure and in many places have almost disappeared. Moreover, under present competitive conditions, much of the equipment still left in storage will be found not only out of date but quite inadequate.

Saving of floor space is again a factor of great importance and will have a larger bearing upon the equipment policy in the drive for profit. It has been demonstrated time and again that the smoothing out of the production lines and the cutting down of travel of raw and finished materials are profit possibilities that can't be overlooked.

While we are on the subject, it is interesting to note the new deal for power presses. Here is a type of equipment that by virtue of inherent ruggedness, good design and honest workmanship, is capable of operating for many, many years—and it has. However, the swing to streamlined body forms and the fenders that go with them has practically put the old presses out of business. Few have either the bed area or the power necessary to draw the large blanks. Here and there as you go through the automotive plants you begin to see new presses and in some cases complete batteries of them. More changes along this line are expected when the 1935 designs get into the hands of the production department.

In summing up, we can say that the machine tool industry has never had a better opportunity to help the automotive factory executives. It is offered a splendid chance to study existing operations and show where improvements can be profitably made.

Fuel Outlook Calls for Close Cooperation Between Refiners and Diesel Designers

"PROSPECTS for Future Diesel Fuels," a paper by A. L. Foster of National Petroleum Publishing Co., was essentially a warning to Diesel engineers that the fuels which burn most satisfactorily in high-speed engines are likely to be scarce and expensive. The fuels having the best characteristics from this point of view are straight-run gas oils of paraffin base, and the author said it was doubtful that in a decade from now even a barrel of straight-run gas oil would be available for Diesel use. One factor that has entered the picture recently is the restriction on crude oil production. The straight-run paraffin gas oil which is so desirable for high-speed Diesel engines is also the very best charging stock for the cracking still. As crude oil becomes scarcer, owing to restrictions on production, it will become imperative for the refiner to extract from each barrel of it the greatest possible amounts of the more expensive products, gasoline and lubricating oil. This means that he must crack as much as possible, and of all the portions of the crude that are usable for cracking, the gas oil fraction is probably the most valuable, because yields are higher, troubles are less, and cracking costs are lower than with other fractions.

The most prolific source of cheap fuel for heavy oil engines for the future—when these engines will be widely used—will be the so-called pressure-distillate bottoms, that portion of the light material from the cracking still which has too high a boiling point to fit it for use in gasoline engines. Since this material is relatively highly cracked it will probably require special treatment to fit it for use in high-speed Diesels, but if engines were designed so they could use this fuel it might become the principal automotive Diesel fuel of the future. These fuels are unsaturated chemically, more or less aromatic, high in carbon/hydrogen ratio, and heavy. The refiners' problem will be to eliminate those undesirable characteristics which cannot be coped with by the engine designer, by chemical treatment, by still operation or by fractionation.

The engine designer's problem, Mr. Foster said, is to design his engine so it can use the most abundant and most economical fuel, so that his product can take advantage of the properties of these fuels, instead of being handicapped by them. Both industries should cooperate, each trying to solve that part of the problem which can be handled by it to the best advantage.

The situation is by no means the same as that which prevailed with respect to gasoline some six years ago. In meeting the demands of gasoline engine manufacturers for a fuel of higher knock rating, the petroleum industry merely did what it would have come to do in the natural course of things a few years later in order to be able to provide sufficient quantities of fuel. When Diesel engine builders demand a fuel of high cetene number they run counter to natural economic trends. The most abundant and cheapest fuel available is not of high cetene value, and technical development should not be directed against the stream.

Functionalism vs. "Eye Appeal"

WALTER DORWIN TEAGUE has been heard before on the subject of functionalism as the basis of design. His talks on the subject always arouse widespread discussion, possibly because—as Lewis P. Kalb puts it—engineers generally prefer to talk about something which they know nothing or little about.

Mr. Teague's plea at the S.A.E. Summer Meeting for artistic rationalization of automobile design from the viewpoint of fitness to function, materials, and construction seemed to leave a deep impression, however. The major difference of opinion perhaps was on the point—also raised at other sessions of the Summer Meeting—as to whether a functionally designed automobile would have eye-appeal.

E. P. Warner probably made out as good a case as any one in the discussion. "The tendency of evolution," Mr. Warner said, "is toward the elimination of human judgment. In automobile design we have taken every basis of judgment away from the prospect, except eye-appeal.

"The artistic judgment of people," he added, "is influenced by their mental attitude toward change. Whenever something new is introduced, some people will like it immediately because it is new; some dislike it for the same reason."

To which Mr. Teague replied with a quotation from Spinoza, to the effect that "we do not desire something because it is beautiful, but it is beautiful because we desire it." Our job in this respect, he pointed out, is to create a standard of judgment or eye-appeal.

As in the various streamlining discussions throughout the Summer Meeting, so here also it was brought out that automobiles have no one pre-eminent function. The wide variations in operating conditions inevitably result in compromises. An example is the question of possible need for tire chains, mentioned at the meeting as having an important bearing on fender design. Mr. Teague, while readily admitting that tire chains would have to be taken into account in functional design, predicted that if they interfered with generalized functional design of the automobile, industry would eventually find a substitute that would not interfere.

Diesel Design Papers Discussed

IN the discussion of the Slonneger and Fischer papers (*Automotive Industries*, June 23, page 778) it was pointed out that the various polytropics are not parallel and that the statement that combustion is completed when the expansion line becomes parallel to the last polytropic crossed is therefore not strictly correct. Mr. Marvin of the National Bureau of Standards called attention to a method of indicator-diagram analysis, similar to that of the authors, in which logarithmic cross-section paper is used, which makes the compression and expansive lines straight. The various polytropics then also are straight lines.

It was further shown in the discussion that the assumption that the heat energy required to raise the pressure from one polytropic to the next is not the same throughout, but a somewhat elaborate analysis by Professor Lichty of Yale University showed that the resulting errors are small and do not detract measurably from the value of the method for practical purposes.

N.A.C.A. Reaches Preliminary Conclusion on Fins and Baffles

THE design of fins and baffles for air-cooled engines was the subject of a Summer Meeting paper by Carlton Kemper, mechanical engineer of the National Advisory Committee for Aeronautics. In air-cooled engines, the heat which must be dissipated to the atmosphere by the fins is equivalent to about 45 per cent of the brake horsepower. In its investigation—still in progress—of the heat transfer from finned metal cylinders in an air stream, the effect of baffles around the cylinders, and the measurement of air quantity and blower power required (in wind tunnel tests) for satisfactory cooling, the National Advisory Committee for Aeronautics has arrived at a number of preliminary conclusions. Among these are the following:

1. The flow pattern indicates dead air regions at the front of the cylinder and to the rear of the break-away position. This was substantiated by determinations of heat-transfer coefficients. (Cylinders were electrically heated.)

2. Within the ranges tested, the heat transfer coefficients were found to vary as the 0.796 power of the air speed.

3. A formula has been developed for the heat dissipation per square inch of cylinder wall area, per degree of average cylinder wall temperature. This, together with the determination of the heat transfer coefficient permits determination of the total heat dissipated. (Values hold for both tapered and rectangular fins.)

4. Optimum dimensions have been calculated for "ideal fins" which will dissipate the maximum amount of heat for a given weight of material (see accompanying figure). Thinner fins, closely spaced, are indicated as desirable. For a specified thickness, heat output can be increased by decreasing the spacing and increasing the width.

5. With regard to cylinder baffles, it has been found that for best results these baffles should fit tightly against the fins, with an entrance angle of 145 deg. The ratio of exit to free flow area between fins should be 1.6, and the extension at the rear should be approximately 3 in.

6. Baffles integral with the cylinder fins have been found to give lower and more uniform cylinder temperatures; they particularly improve conditions at the rear over the best steel shell baffle used. This gain is attributed to the baffle surface acting as heat-dissipation area.

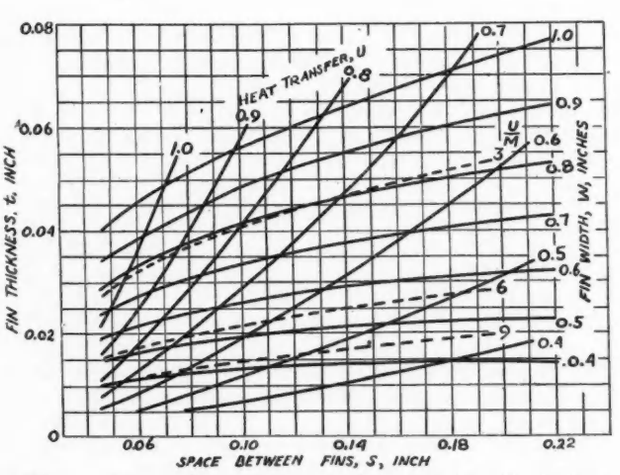


Chart giving dimensions of fins which will dissipate a given amount of heat with the least material

How Efficient Should Superchargers Be?

DISCUSSION of Louis Schwitzer's paper, at the S.A.E. Summer Meeting, on Possibilities of Forced Induction in Automotive Vehicles (AUTOMOTIVE INDUSTRIES, June 23, 1934, page 777) brought out once more the point that the most efficient supercharger is not necessarily the most desirable for an automobile, an opinion of which the late Fred Duesenberg was a leading advocate. Dr. Moss in a written discussion criticized the Graham supercharger for its lack of efficiency. The rejoinder was that under certain conditions actual power losses would be incurred if the efficiency of the supercharger were increased. Mixture conditioning seems to be at least as important, if not more important, than increasing volumetric efficiency by high blower output.

Mr. Schwitzer, of course, advocated the use of superchargers for automobiles, but he also made it clear in the discussion that the reason was not necessarily a desire for smaller engines for a given horsepower output. What was needed was more horsepower per cubic inch, and probably only a part of this would be used in actual reduction of engine size. All of it would be useable in reducing the weight of the engine per horsepower.

Incidentally, this question of engine specific weight cropped up time and again in discussions both in and out of sessions. The majority of engineers felt that radical reduction in specific weights—to practically one-half the present figure—was necessary. It was suggested that aside from the use of superchargers this reduction might be brought about by the adoption of smaller, higher-speed engines with more cylinders, to eliminate torsional periods at the higher speeds, and the wider use of aluminum, as, for instance, in blocks with separate steel cylinder liners.

Spark Plug and Nozzle Now Located in Cylinder Head of Hesselman Motor

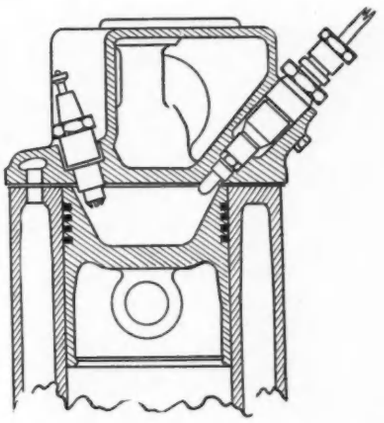
THE Hesselman spark-ignition fuel injection engine, which is manufactured in this country by the Waukesha Motor Co., was the subject of an S.A.E. Summer Meeting paper presented by Torbjorn Dillstrom of Stockholm, Sweden. This engine is an intermediate type between the carburetor and the compression-ignition engine, and its chief advantage is that it runs satisfactorily on a wide range of fuel. It does not require a fuel of high octane value because the fuel is injected only during the latter part of the compression stroke, and it does not require a fuel of high cetene value because ignition is by electric spark and ignition delay there does not occur or is controllable.

The Hesselman engine has been fully described and illustrated in *Automotive Industries*, and its general features are no doubt familiar to most of our readers. Certain recent improvements were described in the paper. A form of combustion chamber different from the original one is now used (see cut). The spark plug and injection nozzle are now secured in the cylinder head instead of in the cylinder wall. This has the advantage that it is no longer necessary to cut slots in the crown on the piston for the plug and injector valve. Consequently, the piston rings can be carried on the crown of the piston, which latter can be made shorter and lighter. The rings being directly on the crown of the piston, it can get rid of its heat to the cylinder walls better, and a higher compression ratio can be used.

With this combustion chamber, as there are no dead pockets, throats or clearances, the fuel can be thoroughly mixed with the air. The importance of this is shown by comparison with a former design in which the crown was reduced in outside diameter so that approximately 10 per cent of the compression space was between it and the cylinder wall. No fuel reached this air, so it was of no use, and by changing the design so as to eliminate this air pocket the output was increased 10 per cent.

Twenty-five models of Hesselman spark-ignition oil engines are now being built, and the engines are being used for trucks, tractors, buses, motor boats and industrial purposes. Experimental work is being carried out on an aircraft engine.

In concluding his paper the author said that although the high-power spark-ignition oil engine was a comparatively recent development, satisfactory results had been obtained, and it had been proved that the basic principles were sound. He expected that the near future would witness further interesting developments, in view of the fact that several well-known firms in the United States, England, Germany, Italy, Sweden and Austria were now cooperating in this work.



Combustion chamber of latest Hesselman engine

FRANK C. MOCK of Eclipse Aviation Corp. in discussing the paper by Mr. Dillstrom said his work had been chiefly along the line of fuel feed, but in this connection he naturally had also studied problems of combustion. He believed spark-ignition injection engines would be found advantageous for many automotive purposes. Stratification was desirable in such engines. To any one who wanted to work along this line he suggested experiments on single-cylinder engines. As many spark plug holes as possible should be provided in the cylinder, as the fuel was non-uniformly distributed and this permitted of determining the best spark-plug location. Further work along this line would disclose possibilities in two directions. One was that of high turbulence and injection early in the compression stroke. This permitted of more power than with an equivalent gasoline engine, but, of course, trouble from knocking was likely to be encountered. The second method consisted in localizing the fuel near the spark plug (absence of turbulence). This would reduce the power but would tend to increase the efficiency. However, it must not be lost sight of that under these conditions not all of the air in the cylinder would be utilized and the excess air, acting as a diluent, would tend to increase the fuel consumption. In these engines a high compression could be used without fear of detonation. They had a tendency to be cantankerous, however, and it was therefore best to work toward a compromise and not carry stratification too far.

Mr. Dillstrom said if it was desired to inject gasoline it should preferably be injected into the manifold during the inlet stroke. The heavier oils could be injected only toward the end of the compression stroke.

Stroboscope Used To Study Flame Travel

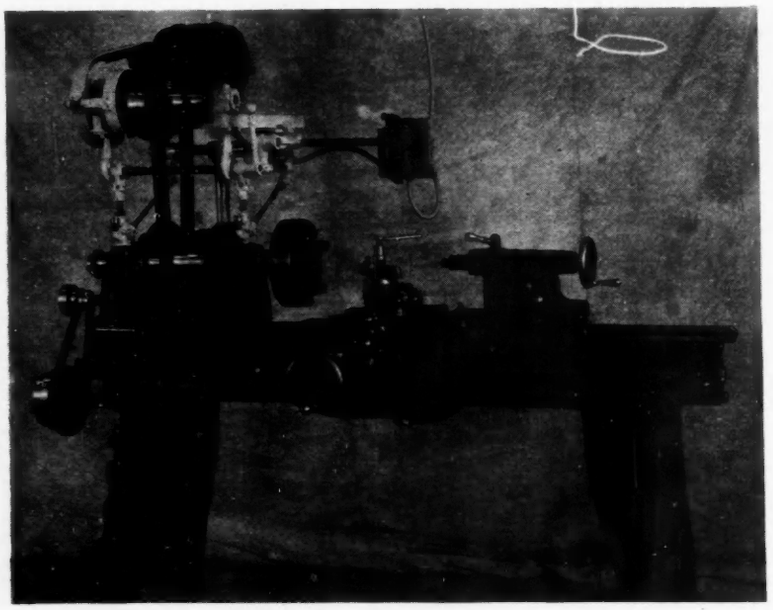
"OBSERVATIONS of Flame in an Engine" was the title of a paper by Charles F. Marvin, Jr., of the National Bureau of Standards. The investigation on which this paper was based was conducted under the sponsorship of the N.A.C.A. A single-cylinder test engine was equipped with a special head in which numerous small windows were distributed over the entire combustion space. The head was observed through a stroboscope, which made it possible to follow the progress of the flame from the spark plug to the most remote part of the combustion chamber.

The progress of the flame could also be recorded photographically by placing a small camera at the eye piece of the stroboscope and making exposures for successive fixed settings of the stroboscope. A certain phase of each of about 250 successive explosions was recorded on the negative. From the photographs thus obtained diagrams were drawn consisting of lines in a horiozntal plane which show the flame front at different stages of combustion.

To investigate conditions in and behind the flame front more intensively, measurements were made of the variations of intensity and spectral distribution of the radiant energy emitted through selected windows in the head as the flame passed under them. Optical filters were used in these tests.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools



Manley Products Corp. New Remco Drive

Remco Line of Motor Drives

In the interest of motorizing production equipment in the multitude of machine shops throughout the automotive industry, Manley Products Corp., York, Pa., has developed the Remco line of motor drives. The line consists of a number of universal mounting bases to accommodate any make of motor, this being combined with a suitable attaching hook-up.

Remco motor drives have been engineered for a great variety of production machines, including drill presses, shapers, milling machines, grinders, etc. The standardized motor drive offers many interesting possibilities. For one thing, it enables the progressive machine shop to modernize its layout by eliminating line shafting, belting, etc., and providing the advantage of individual drive.

Another advantage is that of motorizing individual pieces of equipment, selectively, so that the frequently-used machines can be run at will without starting up the entire line. Where the expense of equipping an entire department may not be warranted at the outset, individual installations should improve the power factor of the shop and make it profitable to operate certain machines. By the same token, this arrangement can apply to items of equipment that are infrequently used, since such machines can be run economically and cut out at will.

The manufacturer advises that certain standard universal bases will be carried in stock, thus assuring prompt service.

Carboloy Announces Six New Grades

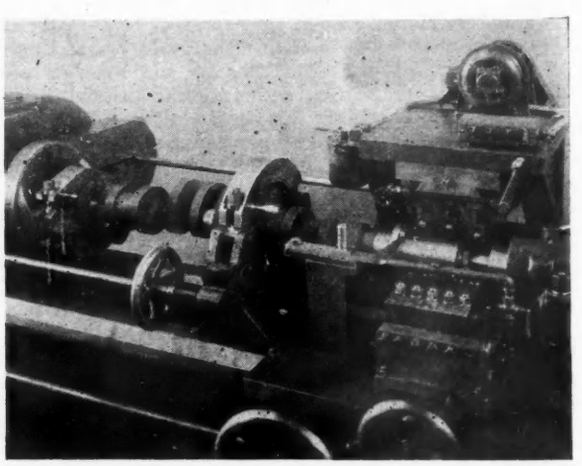
Carboloy Company, Inc., Detroit, Mich., announces the release of six new grades of Carboloy cemented carbide. These supplement the six existing grades and have been developed primarily to obtain improved performance in special fields of application. Among these applications are the rough and finish boring, finish turning and facing of steel brake drums, single-point finish boring of steel connecting rods, re-boring automotive cylinders, and turning-facing-boring piston rings.

Semi-Automatic Crankshaft Lathe

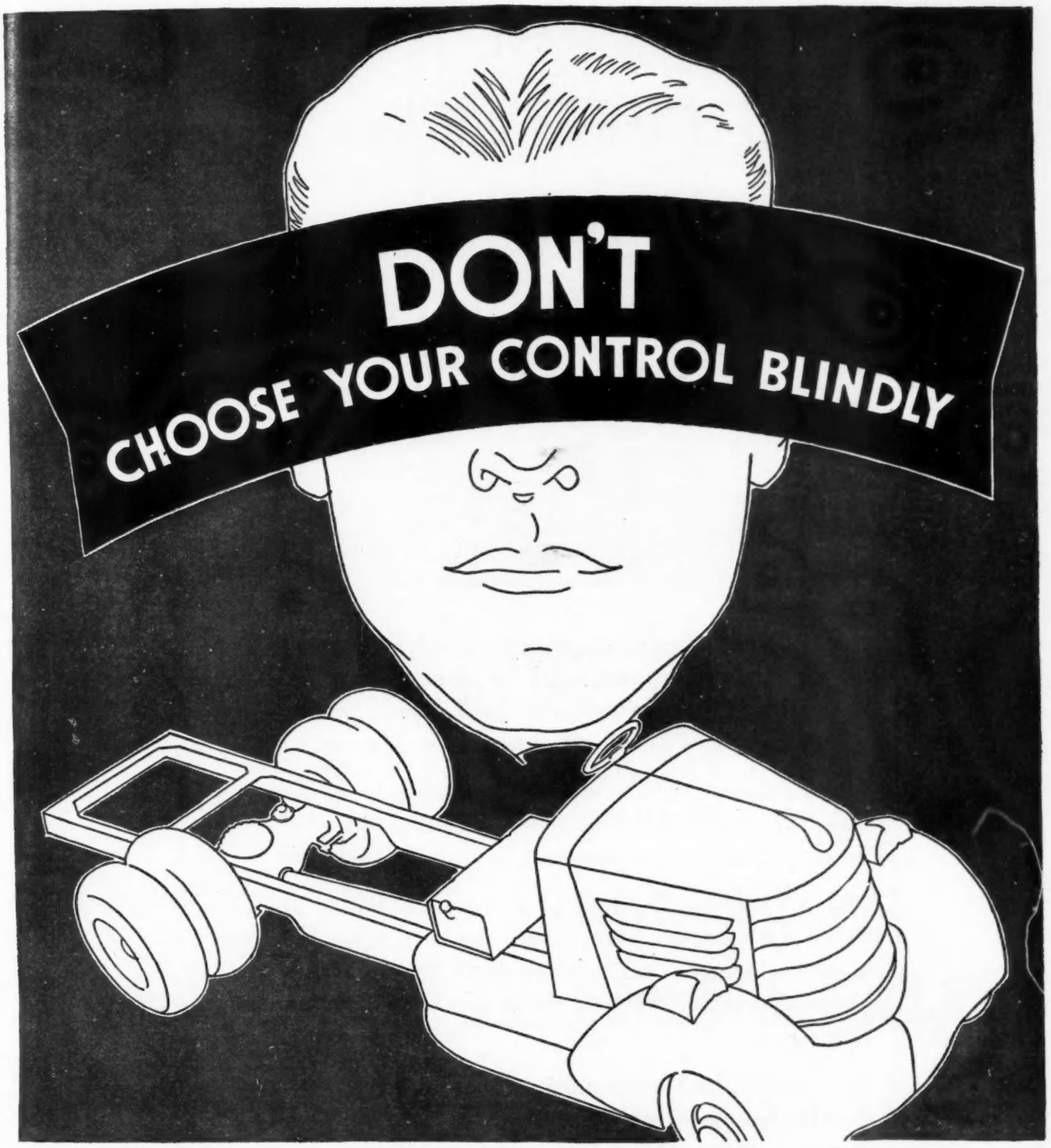
Wickes Brothers, Saginaw, Mich., has just developed a new semi-automatic crankshaft lathe which in the illustration handles the following operations: finish turn, finish face and chamfer flange, finish turn long end of shaft. The job is a 6-throw seven line bearing aviation engine crankshaft, with a Brinell hardness of 319-385. Production is three shafts per hour.

The machine used here is a Wickes 26 in. by 13 ft. semi-automatic lathe with a 12 speed headstock. Power feed is through a quick change gear box arranged for a 10 hp. motor drive through a multiple Vee belt. Automatic stops are provided for both front and back tools. The shaft is mounted on extensible centers and supported on center main line bearing in roller type steady rest. Crank located longitudinally by dial indicator against outside face of flange.

One of the outstanding features of this machine is said to be the fact that the rear cutting tools are carried on an inverted cross slide. As the crankshaft revolves, the pressure on the front tools is downward and the load is therefore taken up on the front cross slide. As the crankshaft revolves, the pressure on the rear tools is upward and the load, therefore, is taken directly against the inverted cross slide which, in turn, is carried in the heavy back tool housing. This permits taking heavy cuts without chatter of the tools.

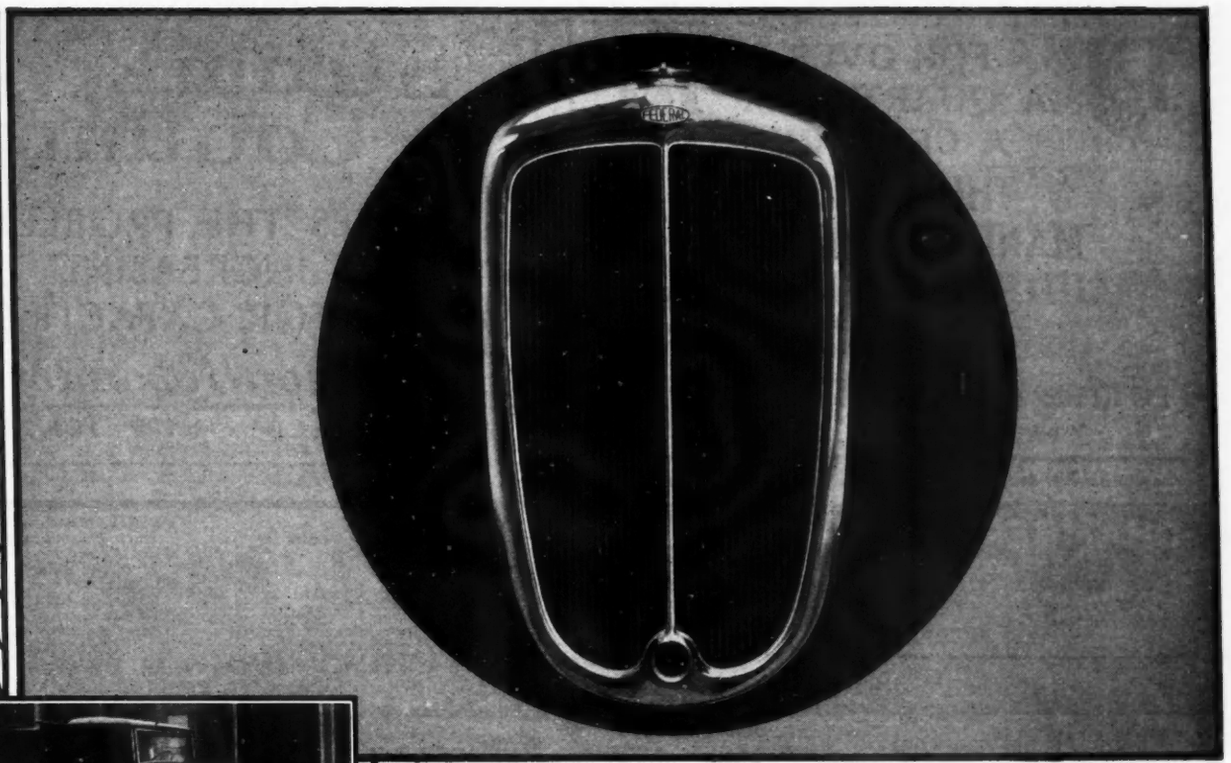


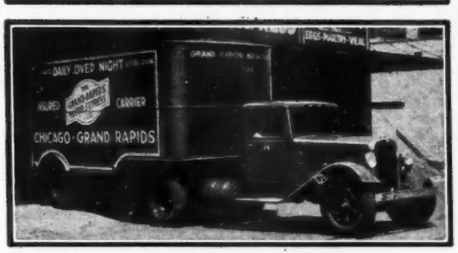
Wickes Bros. semi-automatic crankshaft lathe

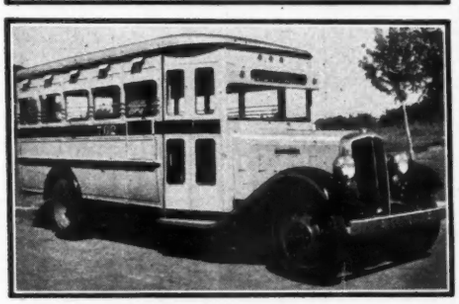


Make up your mind to move with the same deliberation and care you would use in selecting the proper motive power, next time you meet the vitally important subject, Brake Control. Face the subject squarely and, providing you are interested in modern safety and economy, you'll give more than casual consideration to genuine Bendix-Westinghouse Air Control . . . the time-tested equipment which now costs less than ordinary brakes. The undisputed choice of the world's foremost fleet operators for both heavy and light vehicles Bendix-Westinghouse Air Control is more than a positive power-to-stop. Its very presence on the modern, motor transport unit makes available a dependable pneumatic source for the operation of Air-Clutch, Air-Steering, Air-Gearshift, Air-Doors, Air-Horns as well as other Air actuated devices.

BENDIX-WESTINCHOUSE AUTOMOTIVE AIR BRAKE COMPANY, PITTSBURGH, PA.







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AUTOMOTIVE CLUTCHES · RADIATORS · GRILLES

BUYERS' GUIDE

Automotive Products and Factory Equipment Manufactured by Advertisers in This Issue

See Alphabetical List of Advertisers on Page 40

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Grasselli Chemical Co., Inc.

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Bendix-Westinghouse Automotive Air Brake Co.

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Spring
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